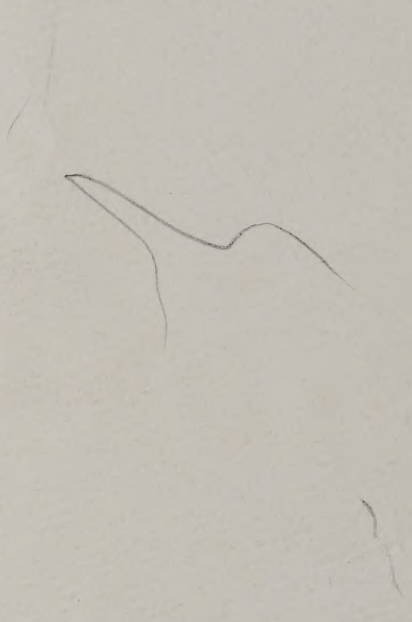
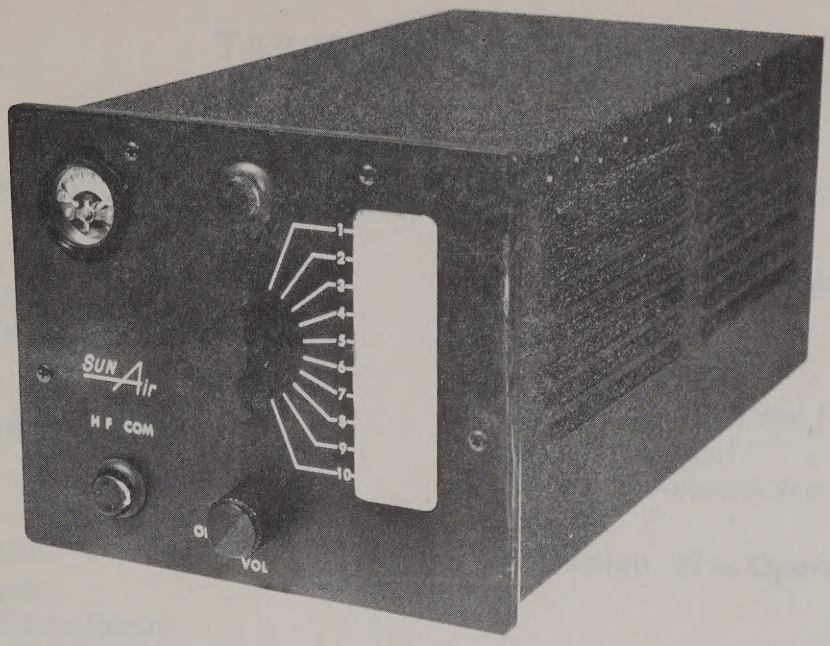
SUNAIR

HIGH FREQUENCY TRANSCEIVER

T - 10 - D
T - 10 - R

SUNAIR ELECTRONICS, INC.
3101 S. W. 3rd Ave.
FORT LAUDERDALE, FLORIDA





The SunAir T - 10 - D Transceiver

Manufactured by
SUNAIR ELECTRONICS INC.
Fort Lauderdale, Florida, U.S.A.

The T-10 Transceiver is designed for use with a single button carbon microphone. 100 ohm impedance.

AUDIO OUTPUT
Speaker: 3.2 ohms
Headphones: 500 ohms

FREQUENCY RANGE
2 to 18 Megacycles

DIMENSIONS
6 1/4 in. by 5 in. by 11 1/4 in.

POWER OUTPUT
35 Watts

POWER REQUIREMENTS
14 VDC @ 2 amps Receiver
@ 12 amps Transmitter
28 VDC @ 1.5 amps Receiver
@ 6 amps Transmitter

WEIGHT
10 pounds

FCC LICENSE DESIGNATION

The SunAir Models T-10-D and T-10-R have been approved for use under Parts 8 and 9 of the Federal Communication Commission's Rules and Regulations.

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ILLUSTRATIONS

SECTION I
GENERAL INFORMATION

1-1 Purpose of Manual

This manual contains installation, alignment operation and maintenance information about the Model T-10-D High Frequency Transceiver manufactured by SunAir Electronics, Inc. The data included is designed to aid authorized service agencies and other technical personnel in the servicing of this unit. It will also act as a detailed guide for those not acquainted with airborne communications equipment manufactured by SunAir.

1-2 Parts Replacement

A complete stock of replacement parts for all SunAir equipment is maintained at the factory. In some cases, the part supplied against an order for a replacement item may not be an exact duplicate of the original part where the original item has been superseded by a newer and more efficient design. Such replacement parts will be interchangeable electrically. If the new part has a different size or shape, all necessary hardware to permit installation in older sets will be furnished. A kit containing special replacement parts is available.

Section V111 of this manual is a complete listing of all replacement parts for the Model T-10-D. Each part is listed according to schematic symbol and its SunAir part number. To avoid delay in shipping, be sure to supply the following information:

a) Quantity required
b) Description of part
c) SunAir part number
d) All Name Plate information

If no shipping instructions are included with the order, method of shipment will be at the discretion of SunAir Electronics, Inc.

1-3 Equipment and Parts Repair

Complete factory service is available on any SunAir equipment. Repairs, adjustments or modifications which are of such a nature as to warrant factory service will be made in accordance with the instructions of the customer.

A standard labor charge per hour, cost of parts, and shipping charges will apply to all non-Warranty work.

1-4 Return of Equipment or Material

To return equipment or material, under Warranty or otherwise, advise SunAir Electronics, Inc. giving full particulars.

If the item is thought to be defective, give full information concerning the nature of the defect. SunAir will then authorize the return. Failure to secure this authorization prior to forwarding the equipment or material, or failure to provide complete information, may cause unnecessary delay in processing.

Shipments to the factory should be prepaid.

1-5 Parts Shortage or Damage

Unpack and inspect all parts and equipment as soon as received. Do not accept a shipment where there is visible signs of damage to the cartons until a complete inspection and physical count of all items is made. If there is a shortage, or if any evidence of damage is noted, insist on a notation to that effect on the shipping papers before signing the receipt from the carrier.

If concealed damage is discovered after a shipment has been accepted, notify the carrier immediately in writing and await his inspection before making any disposition of the shipment.

A full report of the damage should also be forwarded to SunAir. Include the following:

a) Order number
b) Model and serial number
c) Name of transportation agency

When SunAir receives this information, arrangements will be made for repair or replacement.

1-6 Production Changes

Engineering and production changes may be made from time to time in order to incorporate any feature or design which will improve performance, increase reliability or improve the usefulness of the equipment. Notice of such changes will be made through periodic service letters to all SunAir distributors.

When such changes affect the parts list or schematic diagram, a record of the "first used" serial number will be made and noted on the new parts list or schematic. By referring to the serial number, service personnel can quickly determine the proper schematic diagram for a given transceiver.

WARRANTY

The products of SunAir Electronics, Inc. are guaranteed against defects in workmanship and materials for a period of six months from the date of installation. Repair or replacement will be made without charge, providing:

a) The Warranty card was completely filled out and mailed to SunAir Electronics, Inc. within ten (10) days of the date of installation.

b) Notice of claim was made within six months of the date of installation and defective parts returned to the factory in accordance with manufacturer's instructions (Paragraph 1-4).

c) Upon examination of the defective item, the fault - in the opinion of the manufacturer - was not caused by misuse, exposure to abnormal atmospheric conditions, improper installation or adjustment, or incorrect wiring in the field; the equipment had not been improperly repaired, altered or damaged; and the equipment serial number had not been removed, defaced or changed.

SECTION II
DESCRIPTION

2-1 General

The SunAir Model T-10-D Transceiver is a dependable, lightweight, compact, crystal-controlled, high frequency unit having a built-in, transistorized, 14- or 28-volt power supply.

The transceiver incorporates ten transmitting and ten receiving frequencies, and permits simplex or duplex operation, depending on crystal arrangement. It operates on any frequency between 2.0 megacycles and 18.0 megacycles. The SunAir equipment has been proved by an eight-year performance record throughout the world.

The unit, like all SunAir transceivers, is enclosed in an aluminum dust cover that is irridited to prevent corrosion before being given a black "crinkle" finish (Fig.2-1). The dust cover contains louvers on two sides and the back to dissipate heat. The front panel is made of Plexiglas. It is edge-lighted, contains an RF meter indicating the antenna current and durable bakelite knobs to control on-off-volume and channel selection. Two buttons covering the lamps which illuminate the set and the frequency card holder make up the rest of the panel.

The RF meter measures current at the antenna through a remotely located RF inverter (Fig. 5-4). This permits accurate adjust-

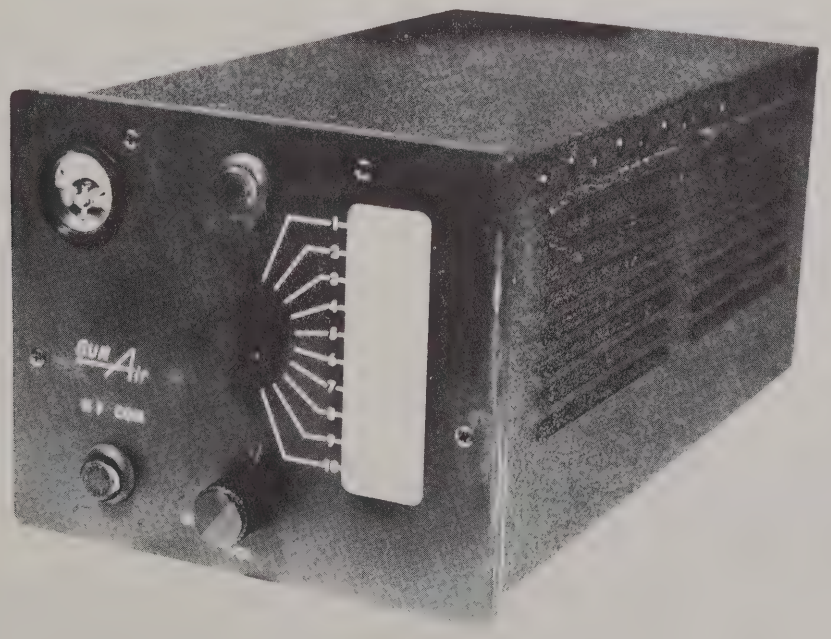


Fig. 2-1. Front view of SunAir T-10-D Transceiver showing control knobs, RF meter and frequency card.

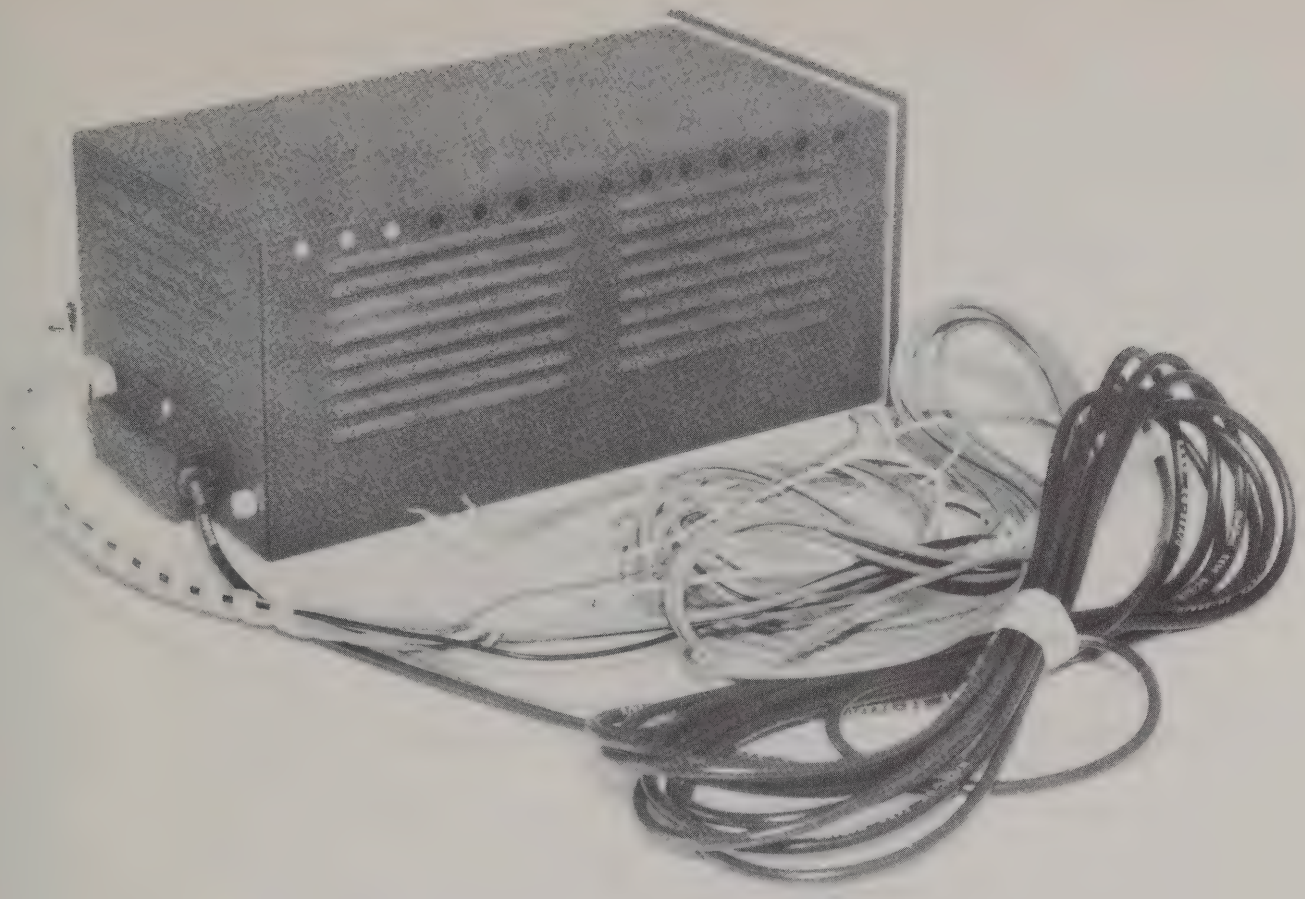


Fig. 2-2. Rear view of T-10-D showing cabling, plug cover and disconnect screw

ment of the reel antenna for maximum performance. The latest advances in electronic design have been incorporated into the Model T-10-D. The printed circuit assembly utilizes the highest quality fiberglass and epoxy resin materials, assuring greater component support and guarding against failure through vibration and shock. Standard parts and components are used throughout. A built-in quick-disconnect in the rear of the dust cover (Fig. 2-2) permits easy removal of the transceiver without disconnecting any wires. Fasteners on the rear of the case provide secure retention and also allow easy removal.

The SunAir Model T-10-D Transceiver is factory-tested and ready to install. It is built of the finest materials available and will take rugged treatment.

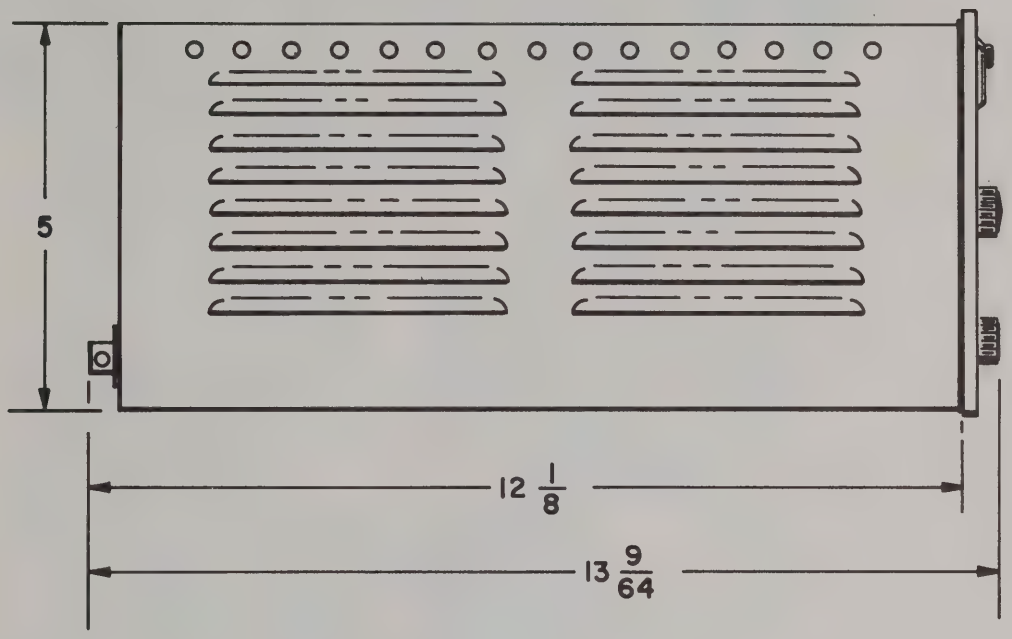
2-2 Performance Specifications

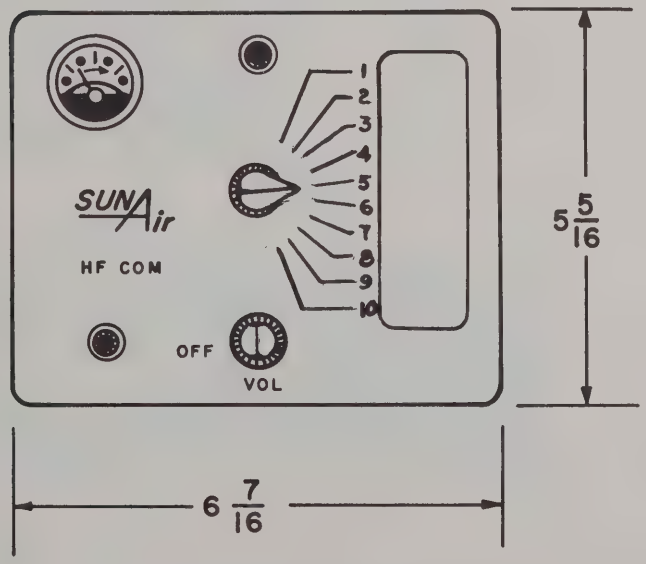
Receiver

Frequency Range: 2:0 to 18.0 megacycles
Frequency Stability: +0.005% over -55°C. to +55°C. on any single channel
Sensitivity: 5uV input to produce 300 mW audio output
Audio Output: Speaker: 3.2 ohms. Headphones: 500 ohms
AVC Characteristics: Audio output will not vary more than 10db between the limits of 10uV and 500,000 microvolts.

Transmitter

Frequency Range: 2.0 to 18.0 megacycles
Frequency Stability: +0.005% over -55°C.





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T-10-D TRANSCEIVER (Overall Dimensions)

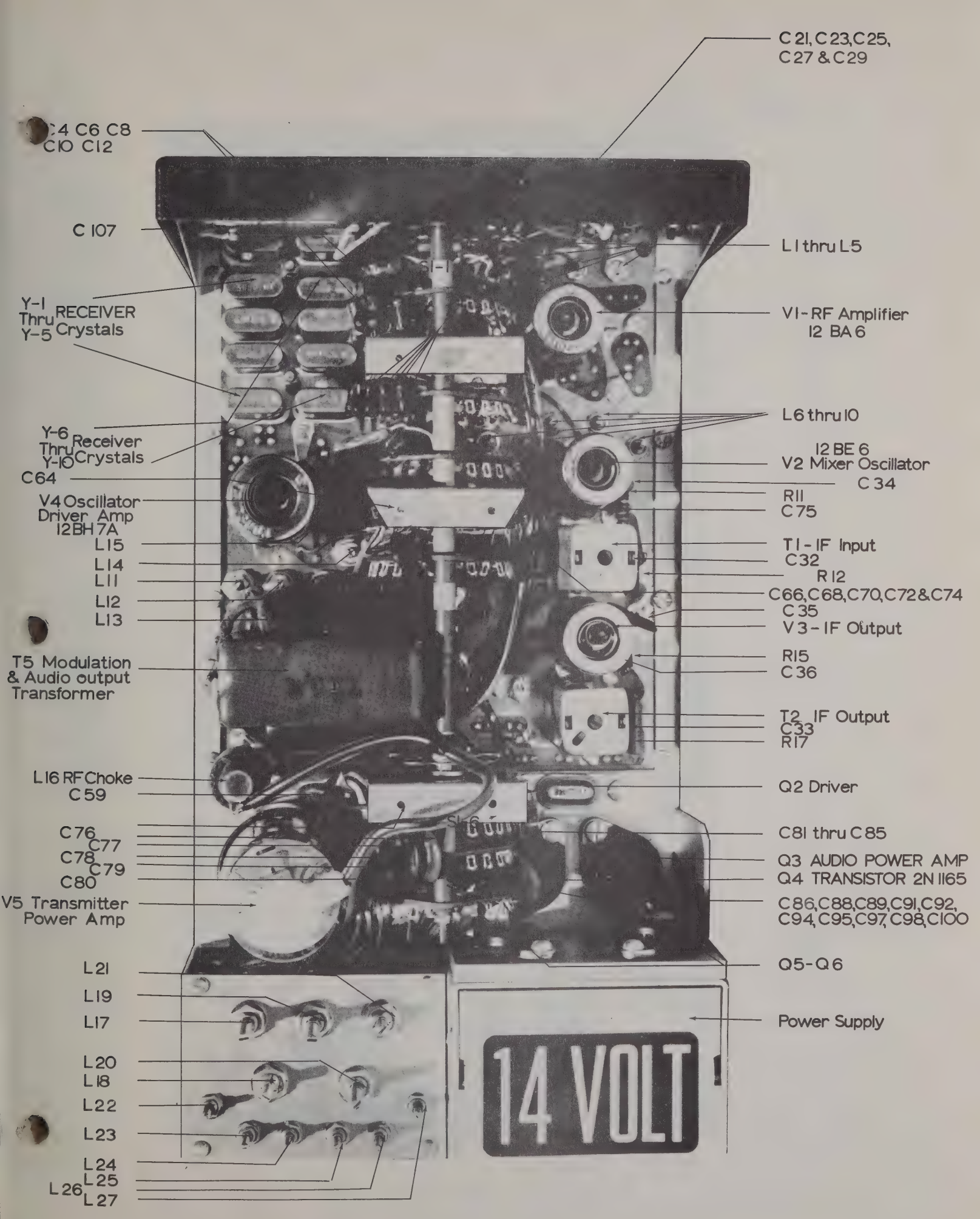


Fig. 2-4. Top interior view, T-10-D

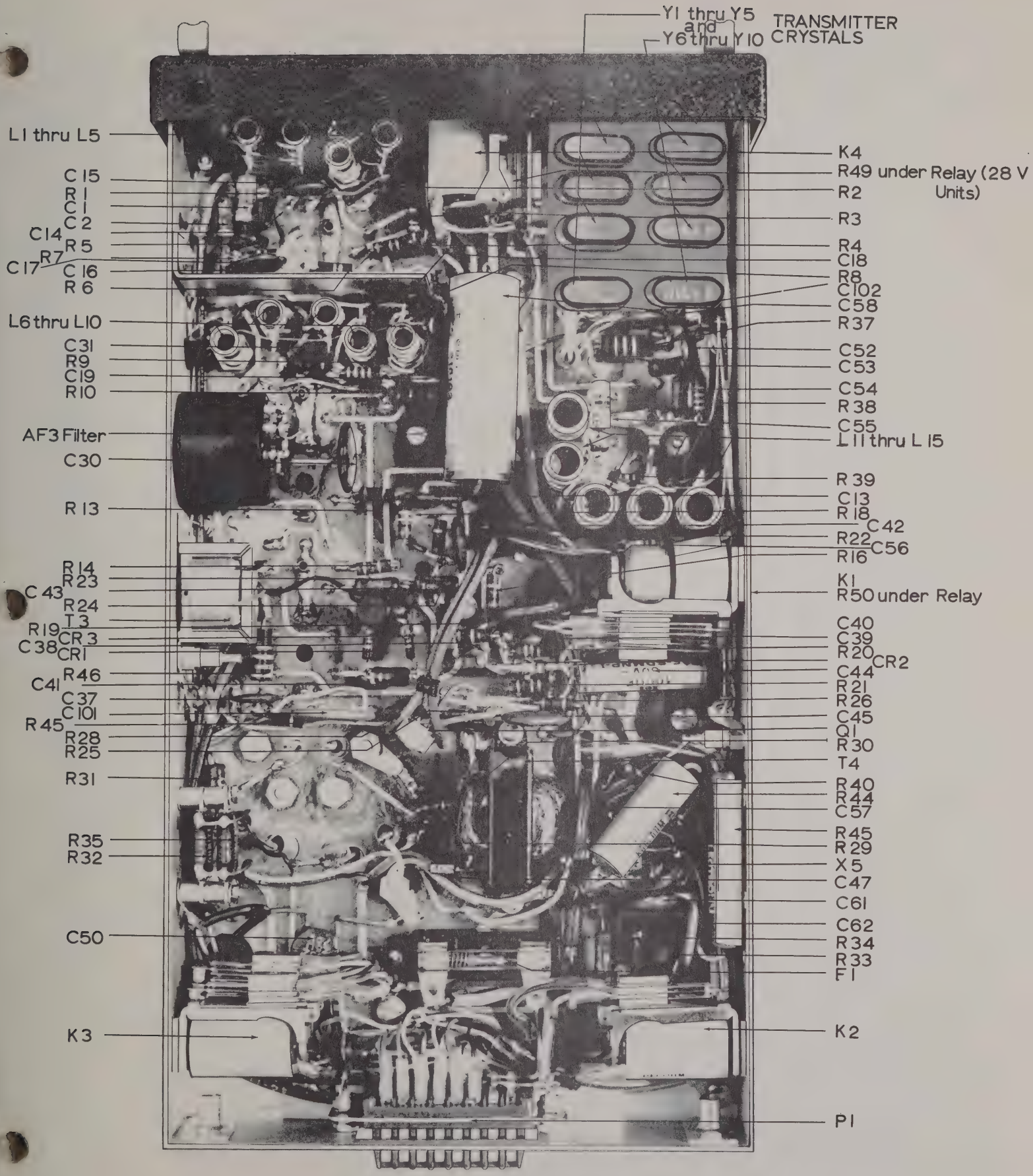


Fig. 2-5. Bottom interior view, T-10-D

to +55°C. on any single channel
Power Output: 35 watts to a 50-ohm load
Modulation: 85% at 1000 cps
Audio Response: Modulation of output carrier does not vary more than 6db over the range of 400 to 2500 cps
Spurious & Harmonic Output: Suppression of spurious radiations exceeds the minimums set by the FCC
Hum & Noise Level: At least 35 db below the demodulated output obtained when the transmitter is modulated at 1000 cps.

2-3 Tube and Semi-conductor Complement

Power Supply

2 - 2N174 (Transistor) for 28 Volt Unit
2 - 2N1165 (Transistor) for 14 Volt Unit

Receiver Section

2 - 12BA6 (Tube)	1 - RF Amplifier 1 - IF Amplifier
1 - 12BE6 (Tube)	Mixer-Oscillator
2 - CSD2648 (Diode) 1 - 1N34A (Diode)	2 - Detector AVC 1 - Noise Limiter
1 - 2N1379 (Transistor)	
1 - 1732 (Transistor)	Audio Amplifier
2 - 1165 (Transistor)	Audio Driver Audio Power Amplifier

Transmitter Section

1 - 12BH7A (Tube)	Crystal Oscillator-Buffer-Amplifier
1 - 6883 (Tube)	*Power Amplifier
1 - 1732 (Transistor)	*Audio Driver
2 - 1165 (Transistor)	*Audio Power Amplifier

(* Same components as in receiver)

2-4 Power Requirements

14 VDC @ 2 amps Receiver
@ 12 amps Transmitter
28 VDC @ 1.5 amps Receiver
@ 6 amps Transmitter

2-5 Dimensions

Transceiver - 6 1/4" by 5" by 11 1/4"
Load Unit - 3" by 5" by 12"

2-6 Weight

Transceiver - 10 pounds
Trailing Wire Antenna Unit - 11 pounds

FREQUENCY SELECTION OF CHANNELS

The SunAir Transceiver T-10-D utilizes one coil for tuning one pair of frequencies in adjacent channels. For example, Channels 1 and 2 are tuned with one coil, Channels 3 and 4 with another coil and so on.

In order to obtain maximum performance from these units the frequency of the adjacent channels should not have a difference in excess of the maximums as listed below:

Table 3-1

CHANNEL FREQUENCY

Frequency Range	Maximum Separation
2 to 5 mc	250 kc
5 to 8 mc	500 kc
8 to 18 mc	800 kc

In addition, a minimum of 5 kc separation must be maintained between adjacent channels 1-2, 3-4, 5-6 etc.

SECTION III
BASIC CIRCUITRY

3-1 Receiver

Frequencies for the model T-10-D are specified by the customer, prior to the assembly of the unit at SunAir.

Proper coils and capacitors for the tuned circuits are installed at the manufacturer s facility. If, at a later date, the customer should desire different frequencies, changes in the coil-capacitor combinations may be required. Refer to table 3-2 for the proper combinations. The changes can be made in the field after the components are purchased from SunAir.

A crystal controlled superheterodyne circuit is employed in the receiver section (see figure 9-1). The circuits are pretuned to the desired frequency. The RF signal enters the receiver at the antenna input connection. The input of the receiver is matched to 50 ohms.

The antenna input coils are mounted on the printed circuit board behind the face plate. The antenna coils and capacitors are selected by switch wafer S1-1 controlled by channel selector switch S-1 located on the front panel. (See figure 2-6)

The mixer coils and capacitors are selected by wafer S1-2. These capacitors, and all others in the transceiver are color coded to RMA standards.

The receiver mixer grid coils are located behind the shield that separates them from the antenna RF coil. The coil for channels 1 and 2 is nearest the edge of the circuit board, and the coils for channels 3-4, 5-6, 7-8 and 9-10 are staggered toward the center of the board.

The capacitors and coils of all channels except the one selected are disconnected from each other (fig. 9-1) and from the mixer grid circuit. This prevents absorption loss in coil capacitor combinations not in use.

The same feature is used in the transmitter P.A. circuit. The RF signal is amplified by V1, tube type 12BA6, the RF amplifier and is capacitively coupled to the grid circuit of V2, tube type 12BE6, the converter tube.

The IF is the resultant beat frequency between the incoming RF signal and the crystal local oscillator operating 455 kilocycles above the receiver frequency. The IF signal then passes through the IF stages consisting of two 455 kc transformers, T1 and T2, and a 12BA6 pentode, V3. It is detected and converted to audio by diode CR1 after passing through the second IF transformer, T2. AVC voltage to control the gain of the RF and IF tubes is also provided at this point by another diode, CR2. The rectified audio signal is passed to a third diode, CR3, a shunt-type noise limiter/squelch.

The transistorized audio circuit is used both for receiving and transmitting. When in the receive position, it amplifies the audio signal through transistors Q1, the first audio amplifier, and Q2, the driver stage.

Transformer T5 is coupled into a push-pull Class B transistor amplifier stage consisting of Q3 and Q4.

The secondary of transformer T5 consists of windings: one matches the DC plate input to the PA and couples the audio into the PA plate of the transmitter; the second is a 3.2 ohm output winding for speaker operation. The 3.2 ohm output is also used for headphone output.

3-2 Transmitter

The audio section is switched to transmit by relay K1 when the push-to-talk button is depressed on the microphone. Relay K2 is the antenna change-over relay, and relay K3 is the B+ change-over relay. When transmitting, transistor Q1 is eliminated from the circuit and the microphone is transformer-coupled through T3 into the driver transistor, Q2. This transistor drives transistors Q3 and Q4 which modulate the transmitter. The low-pass filter, AF3, controls the response of the audio section so that frequencies above 2,500 cycles are attenuated.

The transmitting crystals are switched by the channel selector switch common to the receiver. This same switch also selects the amplifier driver plate coil and the PA coil. Each channel has an individually tuned harmonic trap.

One section of the 12BH7A dual triode, V4, functions as the oscillator; the other section as an amplifier driver. The oscillator circuit in the first triode section is capacitively coupled to the second triode which has a tuned plate load for the individual channels. The amplifier driver is tuned in the plate circuit for each channel by coils L11 through L15 and C66, C68, C70, C72 and C74.

The amplifier driver output is capacitively coupled to the final amplifier tube 6883, designated V5 on the schematic (Fig. 9-1). In the plate circuit of this tube, the audio from the modulator is combined with the PA output and delivers a modulated RF signal into the antenna.

Cathode bias is employed in the PA for tube protection should loss of excitation occur. The PA output circuit consists of Pi network circuits which are tuned to the transmitter frequency by coils L17 through L21.

Capacitors C81 through C85 are selected to give an output impedance of 52 ohms for the frequency in use.

Harmonic traps are employed for each channel to reduce harmonic radiation to within the tolerances prescribed by the FCC. These traps are tuned with coils L22 through L27 and C87, C90, C93, C96 and C99. Two traps are used in parallel on channel 1 to give additional attenuation.

3-3 Power Supply

The transistorized power supply is located in the rear of the main chassis (Fig. 3-3 and Fig. 3-4). AC voltage is generated by the oscillation of transistors Q5 and Q6 producing a square wave at 1500 cps. The AC voltage appearing on the secondary of transformer T6 is rectified by a bridge-type rectifier comprised of diodes CR4 through CR7. One-half of this high voltage is obtained from the secondary center tap and is used to operate the receiver, the transmitter crystal oscillator and buffer. Both circuits are well filtered to eliminate any noise or hum that might be prevalent in the output.

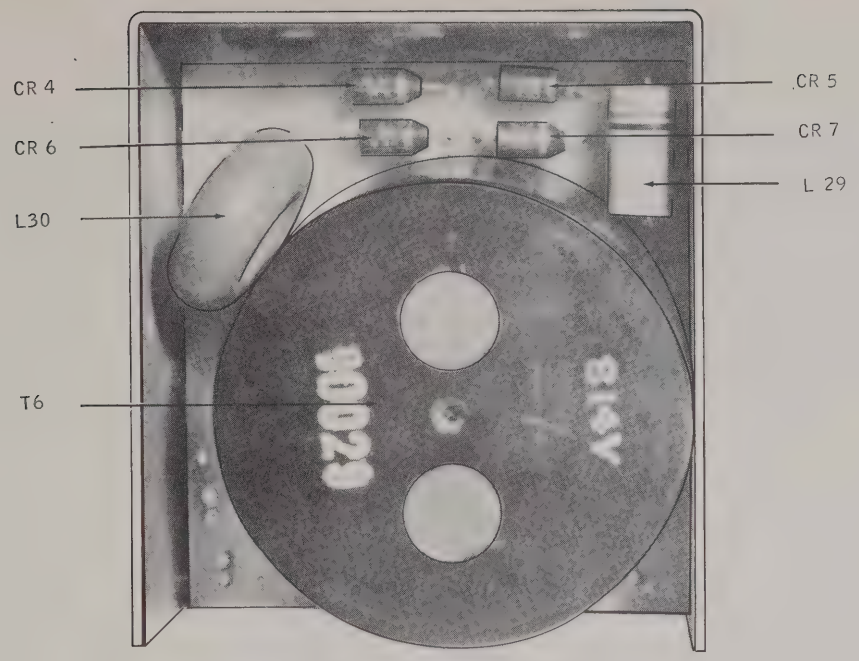


Fig. 3-3. Top interior view, T-10-D Power Supply, showing various components

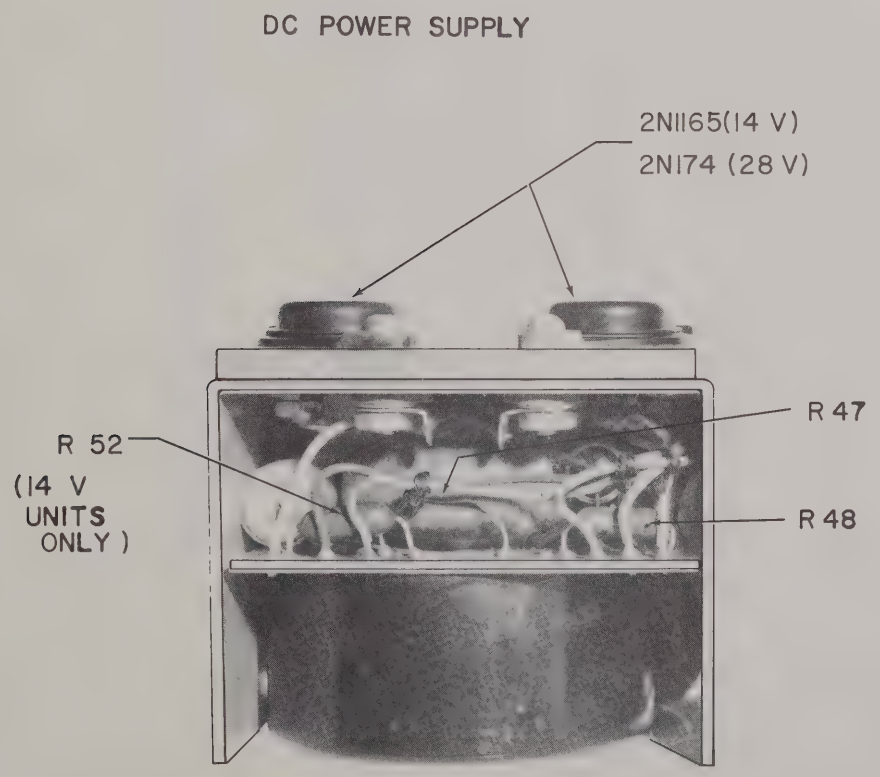


Fig. 3-4. Rear interior view, T-10-D Power Supply, showing various components

COIL-CAPACITOR COMBINATIONS

The tunable coils used in the T-10-D are called out in the following table. The capacitor used with a coil for a given frequency is also designated.

The coils are selected for use at the frequencies of channels 1, 3, 5, 7 and 9. The tuning of channels 2, 4, 6, 8 and 10 is obtained by means of trimmer capacitors (9 to 35 micromicrofarads) switched into the appropriate circuit whenever an even numbered channel is selected. The 9 to 35 micromicrofarad trimmer is sometimes used in conjunction with a fixed capacitor which, in turn, provides the correct tuning range for the frequency of the channel.

Table **3-2**

COIL-CAPACITOR COMBINATIONS

Frequency	RF Coil Mixer Coil	RF Capacitor	Mixer Capacitor	Trans-mitter Buffer Coil	Cap	PI Coil	PI Input Cap	PI Ant Cap	Trap Coil	Trap Coil
2.0- 2.4	A6	100	75	TX6	50	B9	350	1250	D6	330
2.4- 2.8	A6	75	50	TX6	32	B9	250	1250	D6	220
2.8- 3.2	A6	50	20	TX6	20	B8	250	1000	D5	220
3.2- 3.8	A5	50	32	TX5	50	B8	150	750	D5	150
3.8- 4.5	A5	32	20	TX5	32	$B8^{-5}$	120	750	D4	150
4.5- 5.3	A5	20	20	TX5	20	$B8^{-5}$	100	750	D4	100
5.3- 6.0	A4	50	20	TX4	50	B6	100	750	D3	100
6.0- 7.0	A4	20	20	TX3	20	B5	75	750	D3	75
7.8- 8.0	A3	32	20	TX2	50	B4	75	750	D3	56
8.0- 8.5	A3	20	20	TX2	32	B3	75	750	D2	75
8.5- 9.0	A2	32	20	TX2	20	B3	68	750	D2	68
9.0-10.0	A1	32	20	TX1	32	B2	56	600	D1	68
10.0-11.0	A1	20	20	TX1	20	B1	47	600	$D1^{-1}$	68
11.0-12.0	A1	12	12	TX1	12	B1	33	600	$D1^{-2}$	75
12.0-13.0	A0	32	32	TX0	32	B0	33	500	$D1^{-3}$	75
13.0-14.0	A0	32	20	TX0	20	B0	33	500	$D1^{-3}$	68
14.0-15.0	A0	12	12	TX0	12	B0	33	500	$D1^{-4}$	68

COIL-CAPACITOR COMBINATIONS

(Continued)

N O T E

The following trap coils and capacitors to be used on channel one, only.

Each coil is used in parallel as noted in above table.

Frequency (mc)	Coil	Capacitors (mmf)	Frequency (mc)	Coil	Capacitor (mmf)
2.0-2.2	D6 D6	480	3.2-3.8	D6 D6	220
2.2-2.4	D6 D6	440	3.8-4.5	D5 D5	150
2.4-2.6	D6 D6	400	4.5-5.3	D5 D5	100
2.6-2.8	D6 D6	370	5.3-6.0	D4 D4	150
2.8-3.2	D6 D6	330			

SECTION IV
ALIGNMENT

4-1 Equipment Required

The following is a list of the type of test equipment required for the alignment of the T-10-D.

a) RF signal generator
b) AC voltmeter, audio range
c) Bird Thru-line Wattmeter or calibrated load with an ammeter
d) Oscilloscope
e) Frequency counter

4-2 Receiver

The receiver is aligned starting at the output IF and working back to antenna RF circuit.

The IF amplifier section is aligned to the standard IF frequency of 455 kc. Start the alignment with the output IF can and then align the IF can in the mixer circuit. Keep the signal generator output to a minimum to prevent actuating the AVC circuit.

a) Connect an RF signal generator modulated at 400 or 1000 cycles to pin 7 of the 12BE6 pentagrid mixer, V2, and set the frequency to 455 kc.

b) Turn the receiver RF gain fully clockwise. An audio signal should be heard in the output.

c) Connect an audio voltmeter across the two speaker terminals. Carefully touch up the tuning slugs in T1 and T2, the IF transformers. When the meter shows that these are peaked, remove the signal generator from V2.

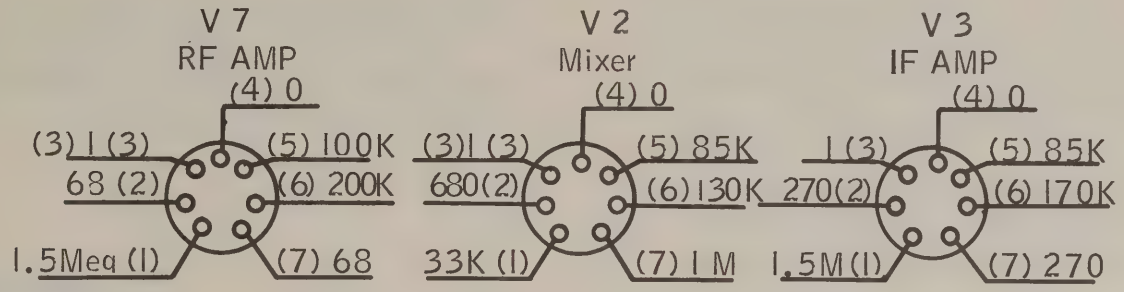
d) Connect the signal generator to the antenna input either at the antenna side of C1 or at the end of the antenna input coaxial cable supplied with the unit. The RF amplifier and mixer are aligned through the use of tunable inductors on the odd numbered channels.

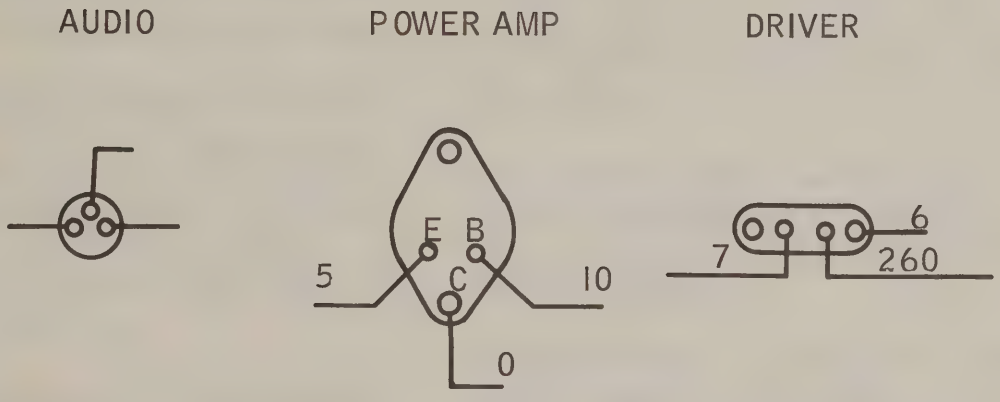
e) Select channel 1. Set the signal generator to the receive frequency for channel 1. Adjust L-6 in the mixer circuit and then L-1 in the RF amplifier circuit for maximum output as indicated on the audio voltmeter connected across the speaker terminals. Channels 3, 5, 7 and 9 are tuned with L-7, L-8, L-9 and L-10 in the mixer circuit and L-2, L-3, L-4 and L-5 in the RF circuit, respectively.

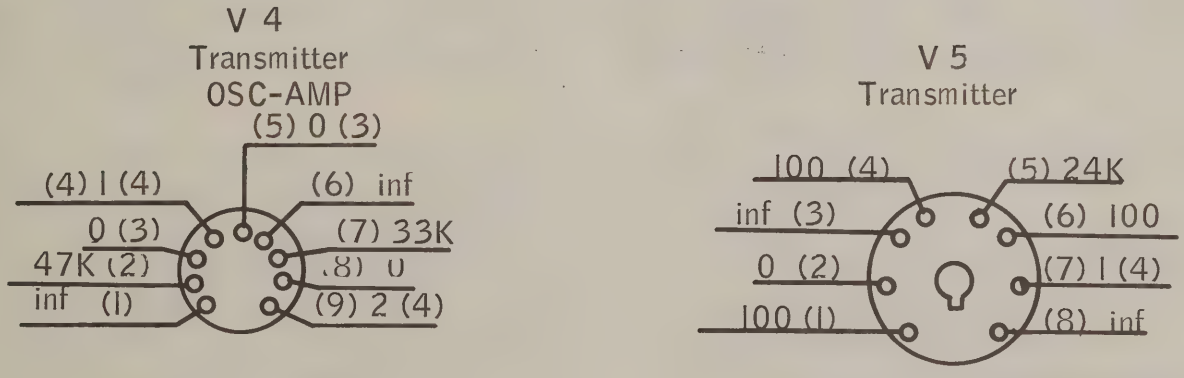
The even numbered channels 2 through 10 are then aligned with the trimmer capacitors C-21, C-23, C-25, C-27 and C-29 in the mixer and C-4, C-6, C-8, C-10 and C-12 in the RF circuits.

f) The RF input from the signal generator is always to be set to the frequency of the receiver on the channel being aligned. As the receiver is being aligned the RF input must be decreased so that the RF level is kept below that which activates the AGC circuits.

RESISTANCE MEASUREMENTS







1. Resistance measurements made with volume control at maximum.
2. Resistance measurements on driver transistor and audio power transistor made with ohmmeter negative terminal grounded.
3. Resistance measurements should not be made on first audio transistor.
4. Resistance measurements peculiar to 28 V units shown in parenthesis.

NOTE: If the frequency of any channel is to be changed, it may be necessary to change the coil-capacitor combinations for that channel. Refer to table 3-2 for the proper selection.

4-3 Transmitter

A Bird Thru-Line Wattmeter or a calibrated 50 ohm load with an RF ammeter in series is used to check the alignment of the transmitter.

The transmitter contains a crystal-controlled Pierce Oscillator. The transmit crystals are switched by a channel selector switch which is common to the receiver. This switch also selects the driver amplifier tuned circuits, the power amplifier tuned circuits and individually tuned harmonic traps.

The transmitter employs two (2) tubes; namely, V4, a dual-triode, type 12BH7-A, and V5, a beam power pentode, type 6883. In the 28-volt units a 6159 beam power pentode is used in place of the 6883.

One section of V4 functions as a Pierce Oscillator. The other section functions as an amplifier-driver. The amplifier (driver) is tuned in the plate circuit for each channel with coils L-11 through L-15 and capacitors C66, C68, C70, C72 and C74. A single coil is used in the tank circuit for two (2) channels, i.e. L-11 for channels 1 and 2, L-12 for channels 3 and 4, etc. The coils L-11 through L-15 are tuned on channels 1, 3, 5, 7 and 9. Channels 2, 4, 6, 8 and 10 are then tuned with C66, C68, C70, C72 and C74, respectively. The amplifier driver is tuned, with the transmitter keyed and without modulation. The circuit is tuned for maximum negative voltage at Test Point #1, in the following sequence:

a) Select channel #1
b) Key the transmitter and adjust L-11 for maximum negative voltage as indicated on a VTVM connected at TP#1
c) Select channel #2
d) Key the transmitter and adjust C66 for maximum negative voltage as indicated on the VTVM connected to TP#1.

Tuning of the driver amplifier stage for the remaining channels is accomplished in the same manner, using L-12, L-13, L-14 and L-15 on channels 3, 5, 7 and 9 and C68, C70, C72 and C74 on channels 4, 6, 8 and 10, respectively.

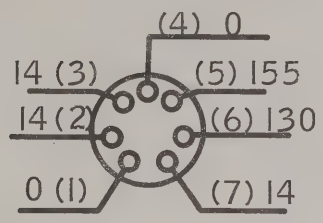
The amplifier output is capacitively coupled to the Power Amplifier V5. Protective cathode bias is employed in the P.A. should loss of excitation occur.

Coupled to the P.A. plate circuit is the PI output network. This network is tuned using coils L-17 through L-21. Tuning of adjacent channels, i.e. 1 and 2, 3 and 4 is accomplished using a single coil.

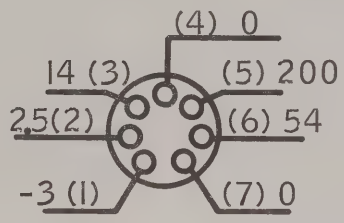
a) Select channel#1
b) Key the transmitter, without modulation applied
c) Adjust L-17 for maximum power as indicated on the wattmeter connected at the antenna terminal
d) Select channel #2
e) Touch up L-17 for proper power output on channel #2
f) Select channel #1 and recheck that power output has remained at the required level
g) Select channel #3 and repeat steps 3 through 6, utilizing L-18 for tuning, and compare power output on channels 3 and 4. Channels 5 and 6 are tuned for output power using L-19, channels

DC VOLTAGE MEASUREMENTS

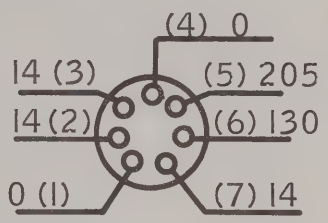
V 1
RF - AMP
Receiver



V 2
Mixer - OSC
Receiver

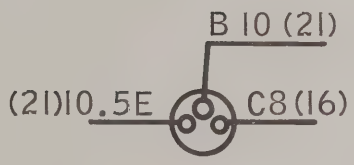


V 3
IF - AMP
Receiver

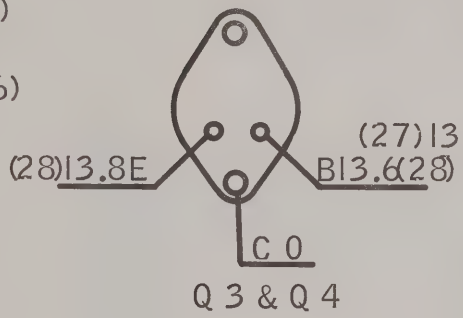


Use extreme caution when taking
voltage measurements on transistors.

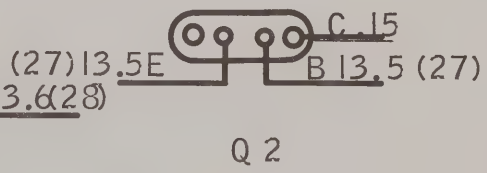
1st. AUDIO



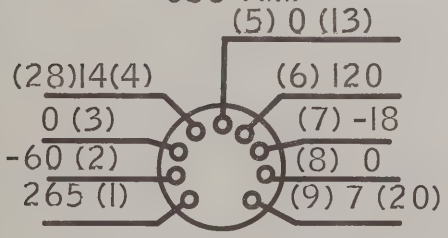
PUSH PULL AMP.



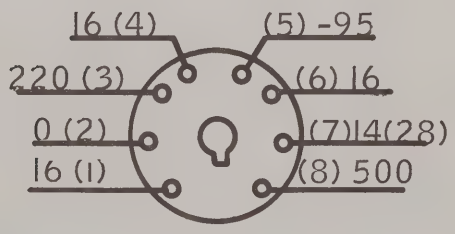
DRIVER



V 4
Transmitter
OSC AMP



V 5
Transmitter P. A.



CONDITIONS OF MEASUREMENT:

1. Receiver voltages taken with no signal input.
2. Volume control full CCW.
3. Transmitter voltages, (V4 & V5) taken with transmitter keyed, no modulation.
4. All voltage measurements made with a VTVM, triplett model 650 or equivalent. Readings will vary with the operating frequency. Readings shown taken at 3023.5 K.C.
5. Supply voltage 14V D.C. as measured at F1 against ground.
6. Voltages of 28 volt units shown in parenthesis. ( )

E Emitter
B Base
C Collector

7 and 8 using L-20, and channels 9 and 10 using L-21.

Tuned traps are used on each channel to reduce harmonic radiation. Two coils are used for channel 1 and 2, L-22 and L-23. Channel 3 and 4 use L-24, channels 5 and 6 use L-25, channels 7 and 8 use L-26 and channels 9 and 10 use L-27. The coils are tuned on the odd-numbered channels 1, 3, 5, 7 and 9. The even-numbered channels 2, 4, 6, 8 and 10 are tuned with trimmer capacitors C87, C90, C93, C96 and C99, respectively.

a) Select channel #1
b) Key the transmitter
c) Modulate the transmitter in excess of 30%
d) Tune a standard receiver to the 2nd harmonic of channel #1
e) Adjust L-22 and L-23 for minimum radiation of the harmonic as indicated by a decreasing output from the receiver
f) Select channel #2
g) Tune the receiver to the 2nd harmonic of channel #2
h) Adjust C87 for minimum output from the receiver.

The traps for the remaining channels are tuned in the same manner utilizing the proper coil on the odd-numbered channels and the associated trimmer capacitor on the even-numbered channels.

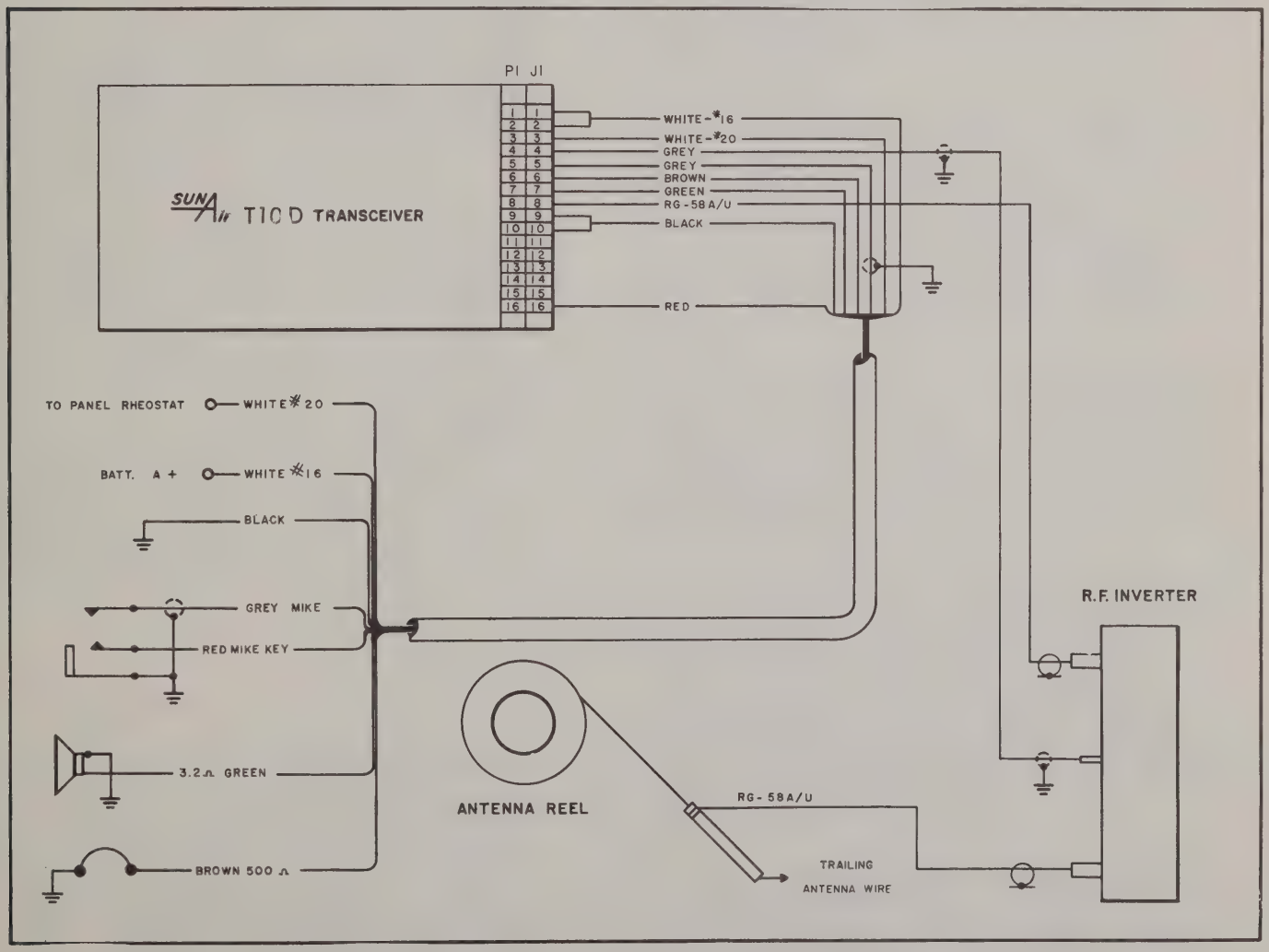


Fig. 5-1. Block diagram of T-10-D Transceiver

SECTION V
INSTALLATION

5-1 Preliminary

When a SunAir transceiver or parts shipment is received, inspect it carefully as soon as possible after delivery. Refer to Section 1 for the procedure to be followed to make a claim for equipment damaged in shipment.

Important - To place your Warranty in effect so that you will receive parts on a no-charge basis, you must fill out the Warranty card and mail it to SunAir within ten (10) days after your new installation is completed.

The FCC requires a pre-operational check after the initial installation of a transmitter to insure that the frequency and deviation are within the tolerances set forth in the rules and regulations governing the class of service for which the equipment is licensed. This, as well as tuning or adjustment of the transceiver, must be done only by a properly licensed radio-telephone operator of the appropriate class or by qualified personnel working under his direct supervision.

5-2 Transceiver

After the equipment has been unpacked and the Warranty card completely filled out and started on its way back to SunAir, inspect all components visually. Remove the dust cover from the transceiver and make certain that tubes, diodes and transistors are firmly seated. Inspect other components to be certain they have not been dislodged in shipment.

These installation procedures are intended only to serve as a general guide and should be altered, as required, to meet individual requirements. Remember - a little care in the initial installation can make a great deal of difference in customer satisfaction with the equipment.

Decide upon the general type of installation and the location of the equipment, antenna reel assembly and accessory items. Make sure all wires and fuel lines will be by-passed when the transceiver is installed and all flight controls will have unimpeded action.

Remove the false panel or use a quarter-inch drill with saw attachment to cut the hole in the panel. File the edges smooth to permit the face plate to fit flush. See Figure 2-3 for exact measurements.

Hold the cover in place and mark it for the four holes that must be drilled to mount it to the brackets. These holes must be countersunk so that no binding will occur when the transceiver is installed. Install the dust cover using four No. 6 metal screws with fiber stop nuts.

The manufacturer recommends that an additional hole be drilled and countersunk at the rear of the cover and an additional bracket be mounted to take the weight of the unit.

This hole is the same size as those in the front of the cover. This will prevent it from angling downward and possibly impeding controls. Slide the transceiver through the hole in the panel into the dust cover. Make certain that male and female connectors at the back of the transceiver and in the dust cover are aligned. Two knurled screws in the back of the dust cover are then tightened to secure the installation.

All wiring needed to connect the SunAir T-10-D Transceiver into the electrical system of the aircraft is attached to the connector at the back of the dust cover. (Fig. 2-2). Each wire is identified for easy installation. The A+ is connected through the circuit breaker to the A+ bus or to the radio master switch. There will be a 15-amp breaker in aircraft with 14-volt electrical systems and a 10-amp breaker with 28-volt systems. If additional wire is needed for this connection, make sure it is of adequate size and equal quality.

Speaker and headphone wires are next connected to the aircraft audio system. T-10-D operation permits use of these units either together or separately. SunAir engineers will provide additional information regarding audio installations if details covering the owner's wishes, the type of aircraft and the type of installation desired are sent to the factory.

The microphone audio and push-to-talk relay wires can be connected directly to the mike jack or the mike selector systems.

The panel light wire is connected to the SunAir circuit breaker or to the aircraft panel light rheostat, if dimming is required.

5-3 Electric Reel and Fairlead

The electric reel assembly weighs 11 pounds (Fig. 5-2). It is necessary to remember this when making an installation in a light plane. The assembly should be installed as close to the rear of the baggage compartment as possible. On heavier aircraft, this weight factor may not be important.

Mounting brackets should be constructed from material that meets FAA standards. Structural members chosen to carry the assembly must be of sufficient strength to support its weight.

Bolt the mounting bracket to the rib of the aircraft with metal screws (No. 832) so that the required number of threads will show through the fiber stop nuts. Bolt the assembly to the bracket.

Begin installing the fairlead by placing the bottom end against the skin of the aircraft and laying the top of the fairlead across the top of the reel. Mark the spot where the hole must be drilled through the skin. The angle of the fairlead to the antenna is very important. If the fairlead is in direct line with the antenna, a poor electrical connection will result. If the angle is too large, excessive drag will be imposed on the antenna and extreme wear will occur on the fairlead.

Once the hole is drilled it must be elongated to fit the angle at which the fairlead is to pass through. Angles and brackets must be built to mount the fairlead securely to the aircraft.

Extra long fairlead and stand-off insulators may produce undesirable transmission effects. Since frequencies of 10 to 15 megacycles have an average quarter wave length of between 12 to 7 feet, nearly all of the antenna should be reeled in.

The RF Inverter (Fig. 5-4) location is generally at the junction of the coax feedline and

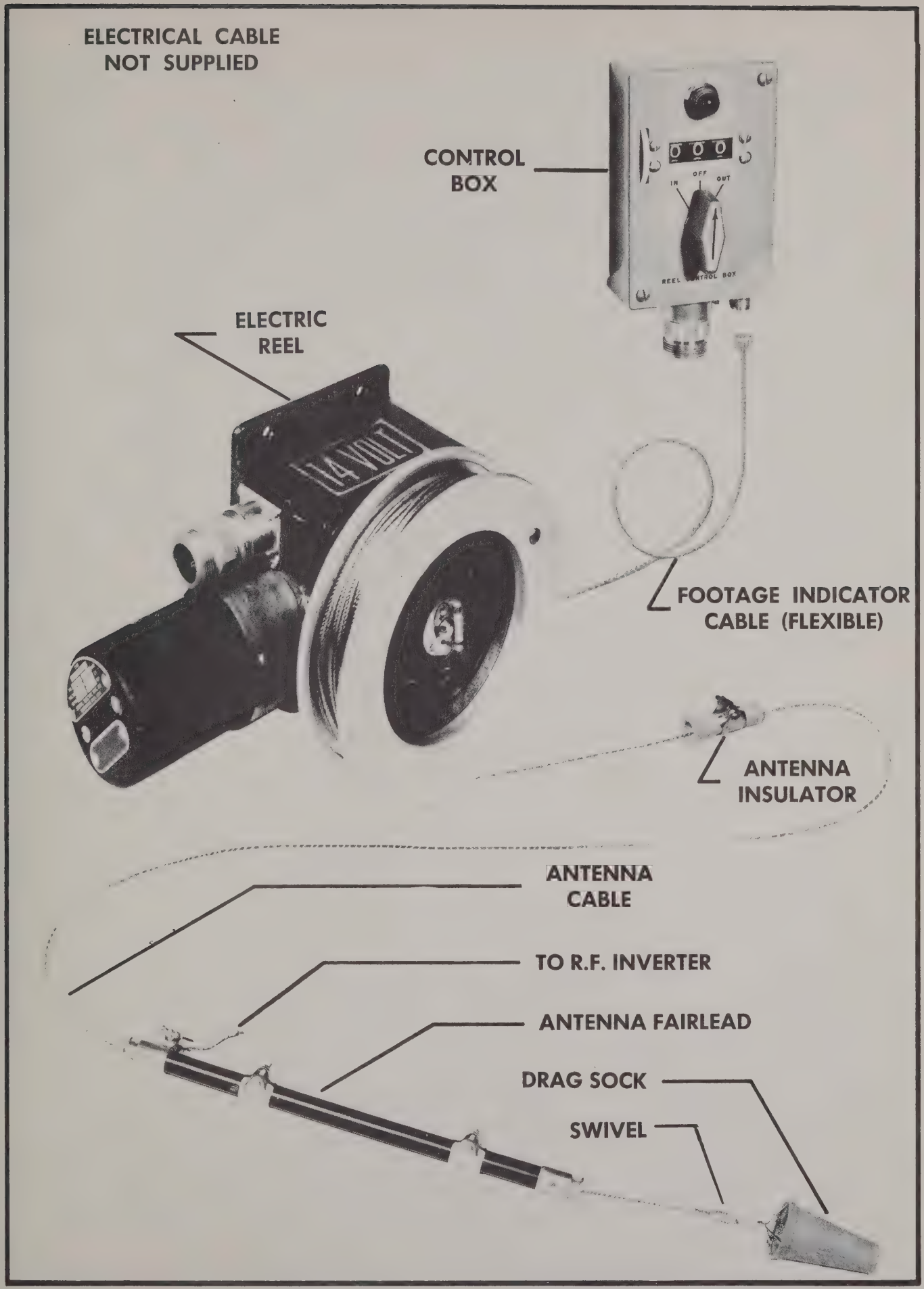
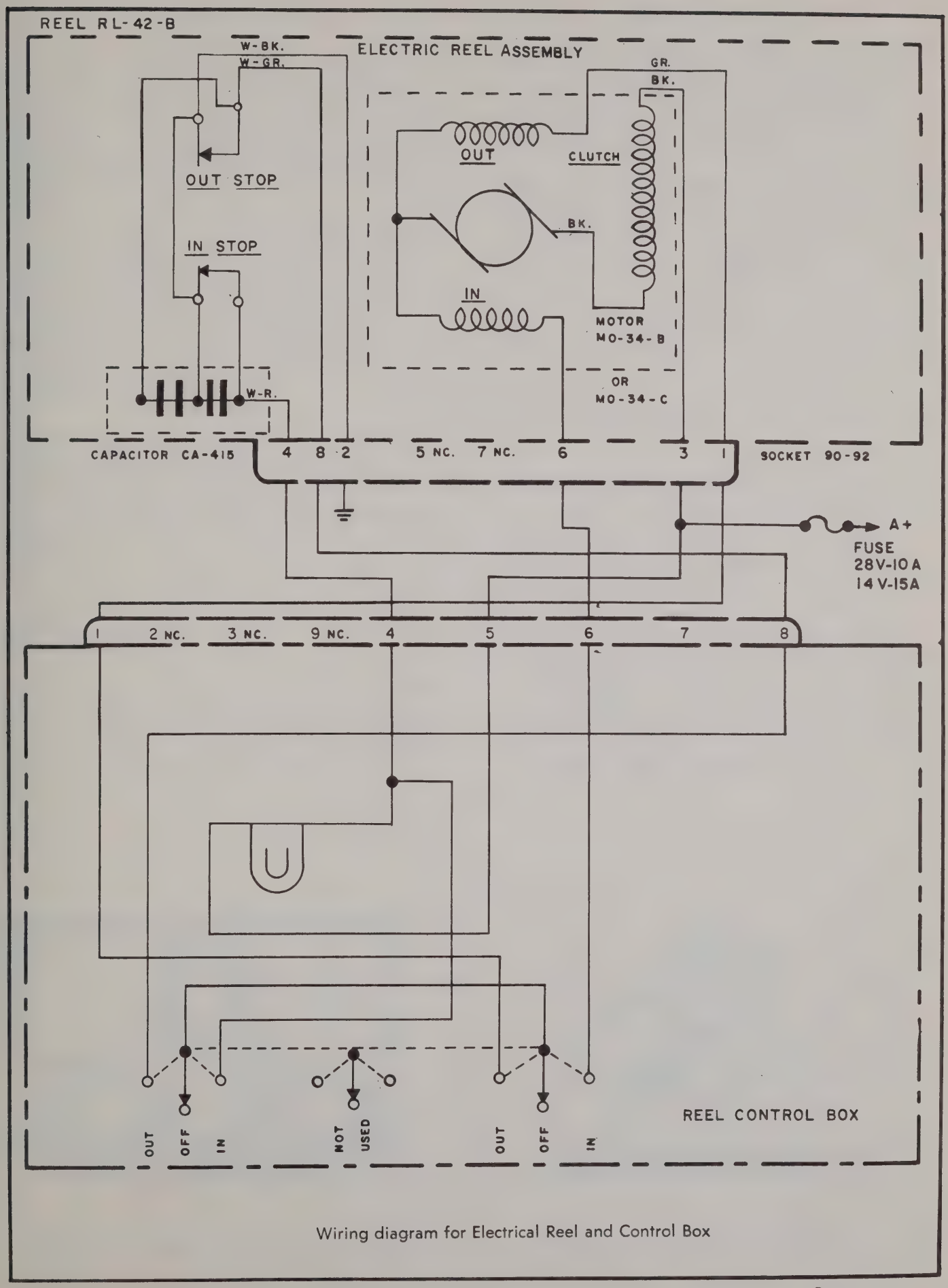


Fig. 5-2. Components of Trailing Wire Antenna installation



Wiring diagram for Electrical Reel and Control Box

the antenna reel. In some cases where the Inverter is, of necessity, located elsewhere in the line, standing waves will produce false indications. If this problem arises, changing the location of the Inverter in either direction on the line may solve it.

All parts needed to complete the trailing wire antenna installation are included in the antenna kit. The chrome-plated swivel in the kit permits easy drag sock rotation. This prevents the antenna from twisting and snapping when it is reeled in. See Figure 5-2 for drag cup installation.

The back half of the drag sock should be sheared off when installing trailing wire antennas on aircraft which cruise at 200 mph or more. This will eliminate excessive drag.

5-4 Manual Reel

Installation of a manual reel may be required in areas where service facilities are infrequent or non-existent. It is similar in many respects to that of an electric reel installation. The manual reel is installed as close to the pilot or operator as possible; whereas the electric reel may be installed anywhere in the aircraft since it is remotely controlled.

Important - The length of the cable from the transmitter to the manual reel should be as short as possible. Severe de-tuning and inefficient antenna loading have resulted on temporary ferry installations when the unit was installed on the rear of the aircraft and a coaxial cable run from the set to the front.

5-5 Fixed Antenna and Load Unit

When deciding upon the location of the load unit (Fig. 3-6) in the aircraft, one important fact must be remembered. The length of wire between the loading unit and the fixed antenna feed-through must be as short as possible. It should be six (6) inches or less. Under no circumstance should it be longer than twelve (12) inches. Excessive length causes radiation inside the aircraft. It will result in considerable detuning and very limited range, even though the meter indicates that it is properly tuned.

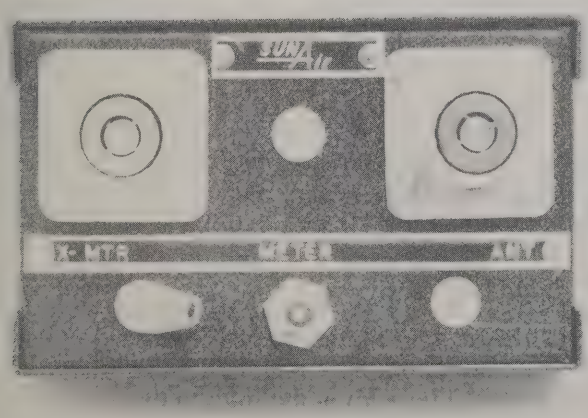


Fig. 5-4. Exterior view RF Inverter

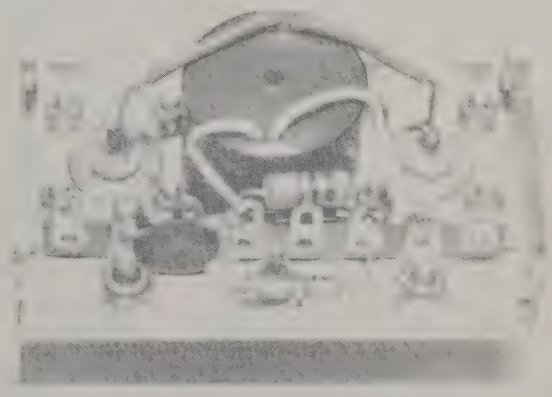
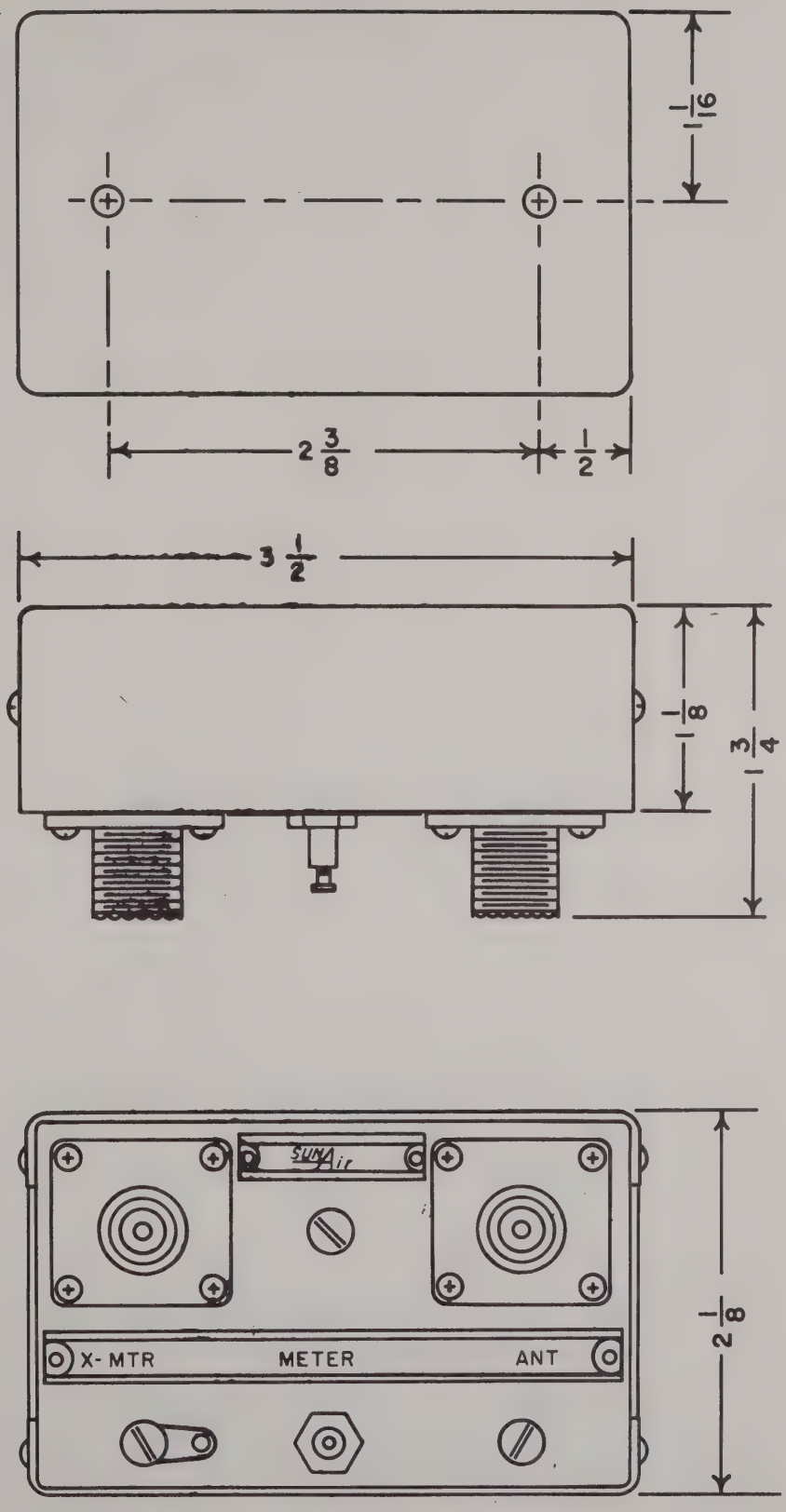


Fig. 5-5. Interior view RF Inverter

NOTE : DRILL TWO (2) 5/32
HOLES FOR MOUNTING
R.F. INVERTER ASSEMBLY

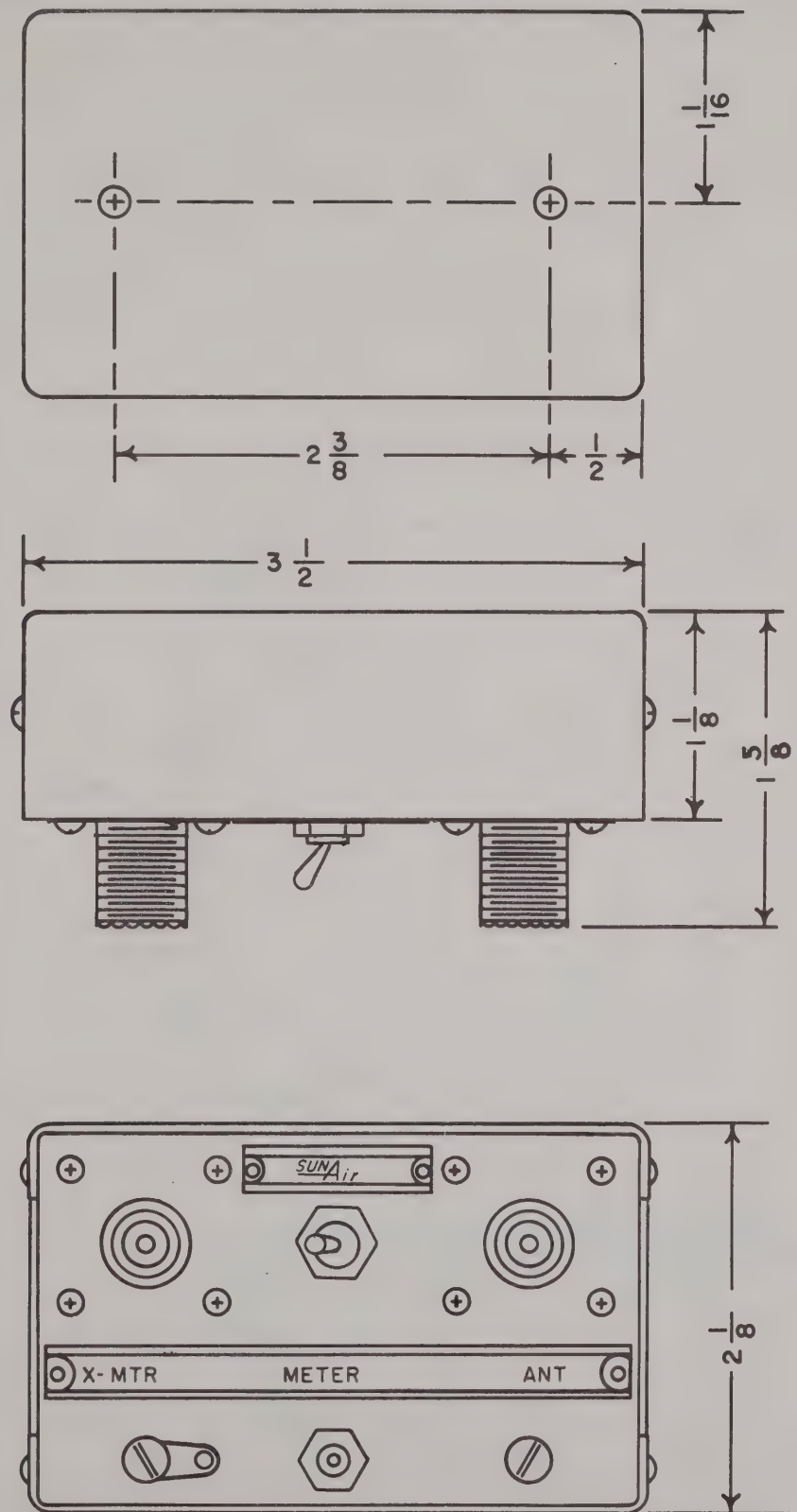


WEIGHT : 7 OZ.

Fig. 5-6. RF Inverter

NOTE : DRILL TWO (2) 5/32
HOLES FOR MOUNTING

SWRD-1
STANDING WAVE
RATIO DETECTOR
SunAir P/N 91396



WEIGHT : 7 OZ.

Fig. 5-6. Standing Wave Ratio Detector

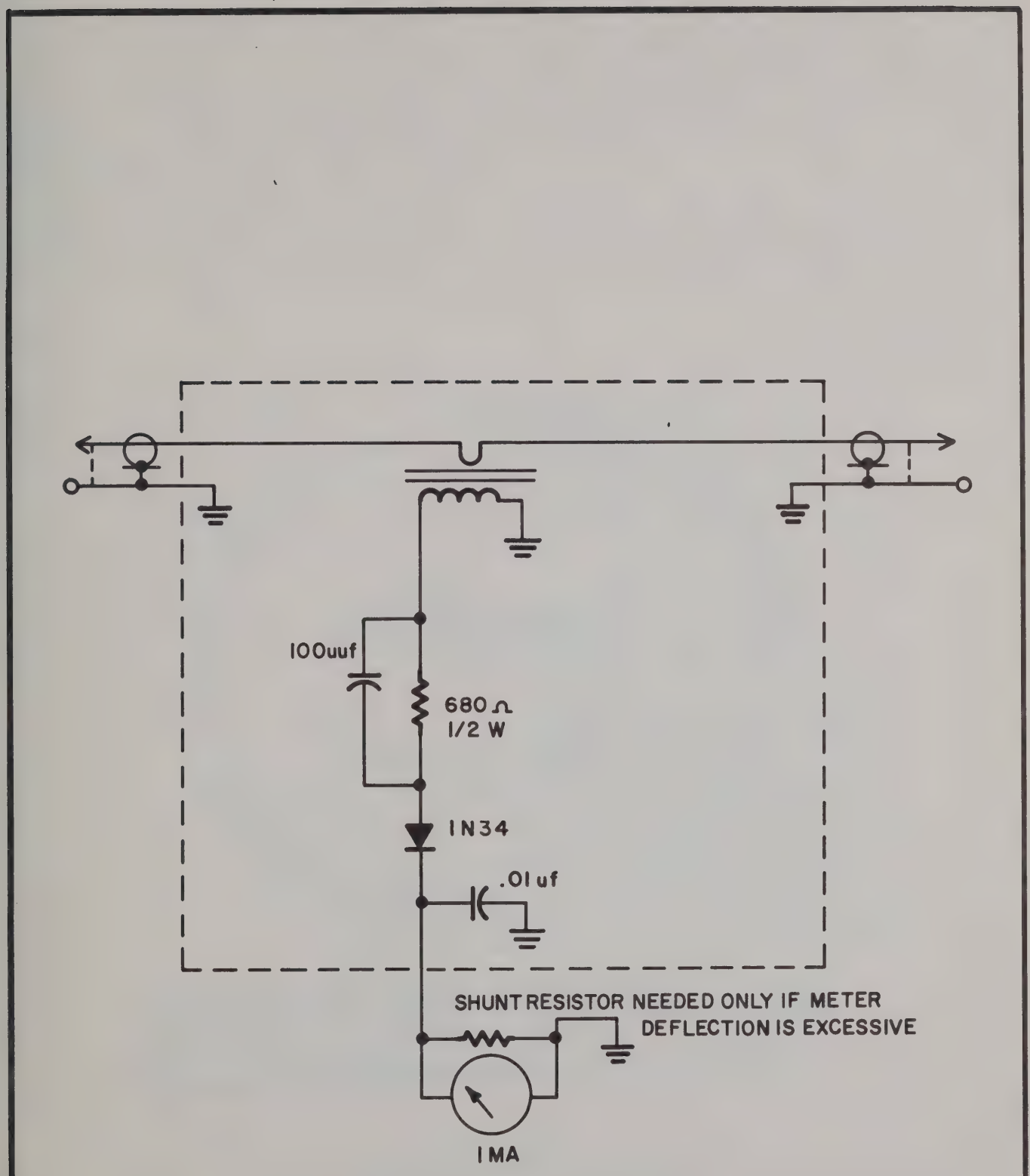


Fig. 5-7. Schematic of RF Inverter

When calculating the length of the antenna, the length of the lead should be considered as this lead becomes part of the radiating element.

The antenna and load coil should be matched to the transmitter. The transmitter should not be tuned to the antenna. Tuning the transmitter to the antenna results in severe de-tuning, excessive current usage and overheating. Under no circumstance should the transmitter be re-tuned unless a 52-ohm load is connected to the transmitter output.

A fixed antenna kit is available from SunAir. The various parts are shown in Figure 5-8. They are relatively easy to install and should present no problems.

Important - All solder joints must be extremely solid to avoid trouble caused by vibration, corrosion and arcing.

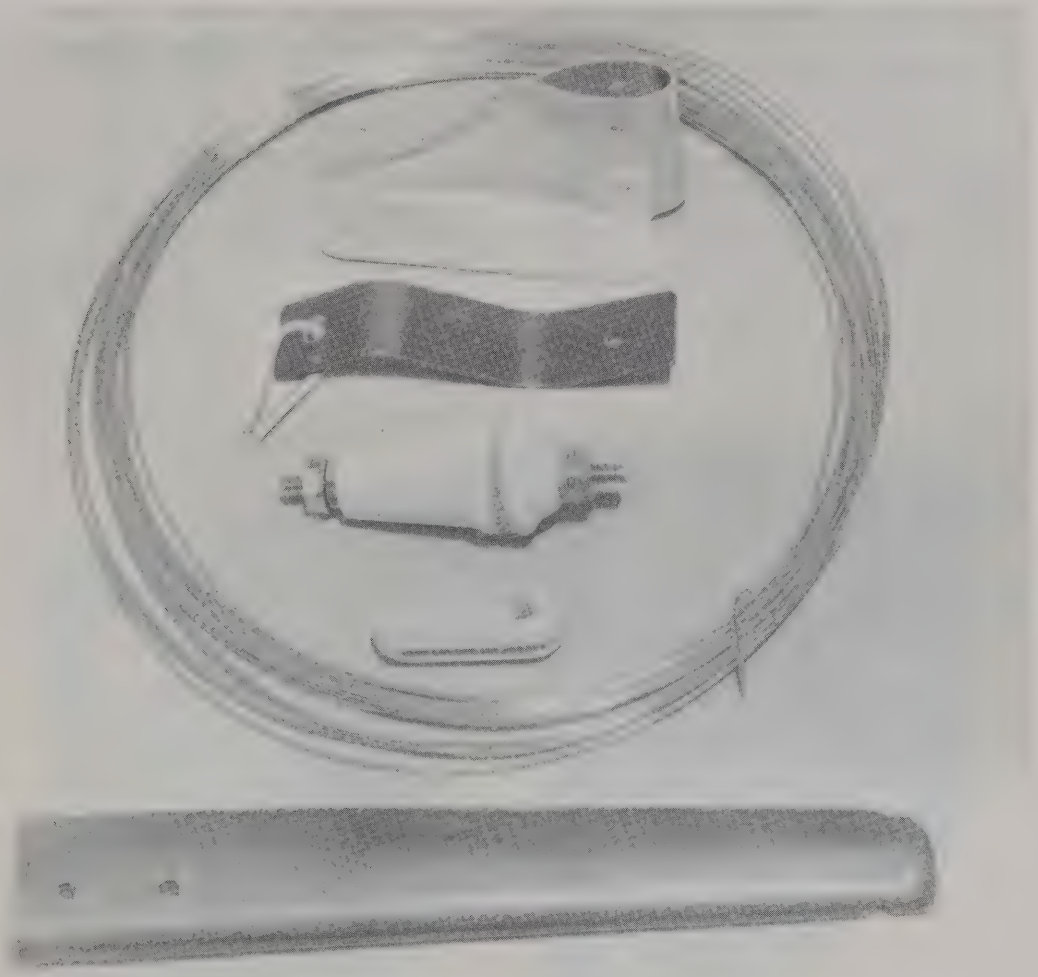


Fig. 5-8. Fixed Antenna Kit

SECTION VI
OPERATING PROCEDURES

6-1 Transceiver Controls

All controls for operating the SunAir Model T-10-D Transceiver are located on the front panel (Fig. 6-1).

The bottom knob marked "VOL" is the on-off-volume control. In the extreme counter-clockwise position, it turns off the power. When this knob is advanced in a clockwise direction, it turns the transceiver on and increases receiver volume with continued rotation.

The center knob-pointer is the channel selector. It selects the desired frequency. The T-10-D has ten channels.

The meter in the upper left-hand corner is the RF Meter. It is activated whenever the microphone press-to-talk switch is depressed. It is used in conjunction with the trailing wire antenna and indicates the point at which the antenna is tuned to 52 ohms.

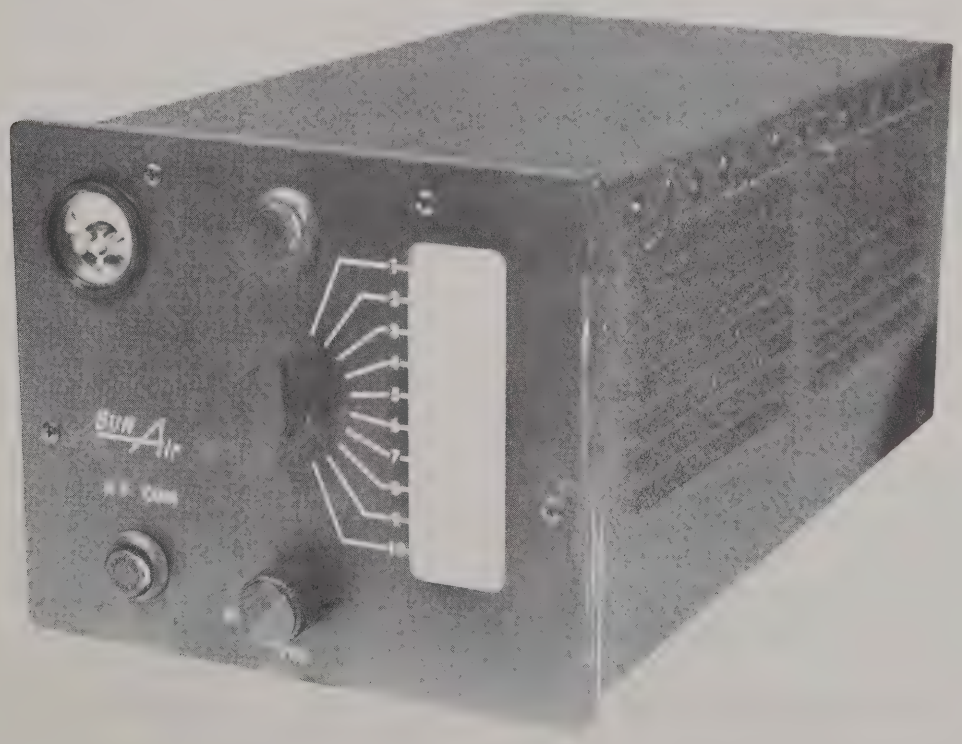


Fig. 6-1. Front panel of T-10-D showing control knobs, RF meter and frequency card

6-2 Trailing Wire Antenna Electric Reel Control

The trailing wire antenna control box is mounted as close to the pilot or operator as possible, usually on the side panel of the aircraft. Figure 6-2 illustrates this control. Switching the pointer knob from its centered position marked "OFF" activates the reel motor and permits the antenna wire to be pulled from the reel by the drag cup. As the antenna wire leaves the reel, the length of wire released is recorded on the dial directly above the pointer knob.

The operator may either depress the microphone press-to-talk switch and watch the RF meter on the transceiver front panel until it registers maximum deflection and then stop the reel, or, if he is familiar with the equipment, he can stop the reel after the approximate length of antenna needed for the frequency is registered on the reel control box. Exact antenna length can then be determined by depressing the microphone button and watching the RF meter. Generally, the higher the frequency, the more deflection there will be. The reel is stopped by turning the pointer knob in a counter-clockwise direction to the position marked "OFF." To return the antenna to the reel, the operator moves the control again in a counter-clockwise direction, to the position marked "IN."

A signal light at the top of the antenna control box is lit when the antenna is released. It should go out when the antenna is reeled in completely. If it fails to do so, the reel has not pulled in the drag cup completely and the micro switch in the reel assembly must be adjusted.

6-3 Transmitter Control

To operate the transmitter, hold the microphone in the palm of the hand with the thumb resting lightly on the press-to-talk switch. Hold the microphone close to the lips and press the microphone switch. Initiate a call and release the microphone button. If transmission and reception are clear and undistorted, no further checks are necessary.

Important - Do not operate the transceiver without an antenna or suitable dummy load connected to the antenna jac k.

6-4 General Operating Procedure

To a large extent, the degree of satisfaction obtained from the use of any communication equipment depends upon the operator. A casual or indifferent microphone technique can result in a very substantial loss in communication range. In many cases, other aircraft will be using the same frequency and will be trying to contact the same operator with messages of equal urgency or importance. The following suggestions are offered to help obtain the maximum utility from the SunAir Model T-10-D Transceiver.

a) Always monitor the frequency to be certain another operator is not using it before making a transmission.

b) Hold the microphone close to the lips and speak clearly and distinctly. Use a normal voice level. Loud talking or shouting are not necessary and will distort the transmission.

c) Keep all transmissions brief and to

the point. Avoid cluttering the frequency with unnecessary conversation.

d) Have the transceiver checked at regular intervals by a competent radio service agency to make certain it is always in good operating condition. A gradual loss of performance might otherwise go unnoted and communication range be reduced.

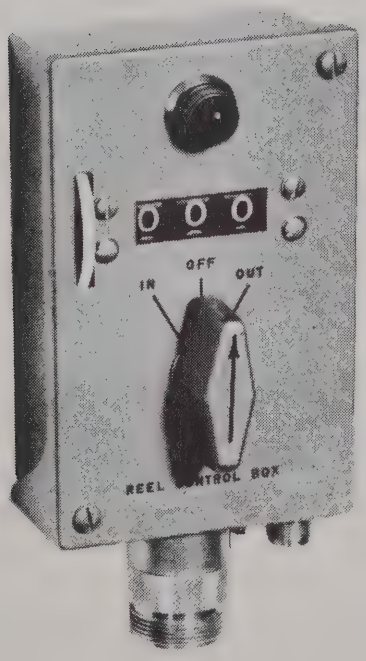


Fig. 6-2. Trailing wire antenna control box

SECTION VII
MAINTENANCE

7-1 General

As in all electronic equipment, periodic inspections should be made by properly qualified technical personnel to insure optimum performance at all times. This might also correct any condition which could result in equipment failure due to improper adjustment, tube aging or component failure. No servicing of the SunAir Model T-10-D Transceiver should be attempted until the technician has become completely familiar with the basic circuitry and has a thorough understanding of the characteristics of high frequency transceivers. In general, maintenance can be simplified by searching out a definite symptom of a fault. By referring to the block diagram and schematic diagrams, a condition or series of conditions which might cause the symptom may be located. This will usually localize the probable source of trouble and eliminate those sections of the transceiver which are operating properly.

Many times the very simple and more obvious sources of trouble are overlooked. This might occur because of a non-technical operator's description of a particular fault. For this reason, always check the entire installation for potential troubles before actually removing the transceiver for maintenance work.

7-2 Recommended Test Equipment

The following equipment or its equivalent is recommended to test the SunAir Model T-10-D Transceiver:

a) Signal Generator capable of a range from 200 kilocycles to 15 megacycles - Hewlett-Packard Co., 275 Page Hill Rd., Palo Alto, California.

b) Oscilloscope - 515A Tektronix, Beaverton, Oregon.

c) Vacuum Tube Voltmeter - Hewlett-Packard

d) RF Thru-Line Wattmeter with an output impedance of 50 to 52 ohms. - Bird Electronic Corp., 1800 E. 38th St., Cleveland 14, Ohio.

e) A calibrated 50-ohm dummy antenna may be used in place of the wattmeter

f) Battery Eliminator AC Supply - Gates Electronics, 2243 White Plains Rd., Bronx 67, New York.

Although several automobile batteries can be used with taps at each cell to provide a crude range of adjustment, the upkeep and long-range maintenance cost will invariably prove

to be more costly than a good battery eliminator type of DC supply.

7-3 Preventive Maintenance

The SunAir Model T-10-D Transceiver is constructed of top-quality materials. Electrical components are designed to withstand rugged treatment. However, there is a time in the life of any piece of communications equipment when, through hard use, misuse or component wear, service will have to be performed.

Whenever possible, a routine program of preventive maintenance should be set up in order to reduce to a minimum the number of interruptions for service work. The following list has been prepared as a guide to indicate the items which should be included in a preventive maintenance program. Unusual environmental or installation conditions may make it necessary to expand or alter this list to meet individual requirements in the field.

a) Check all plugs, connectors, tubes and fasteners for proper seating and security.

b) Remove the transceiver from its cover and inspect it. If there is an accumulation of dust particles, remove them with a clean, dry brush or a clean dry source of compressed air. Blow out or brush any dust from the cover.

c) Clean relay contacts only with approved contact cleaning fluid and approved contact burnishers.

d) Check battery connections. These must be clean and tight at all times. Check the battery at frequent intervals for condition and electrolyte level. Add water, as required, to keep the electrolyte at the proper level.

e) Check the microphone plug, cable and hanger bracket. Check all plugs and connectors for proper seating and security.

f) Inspect the antenna carefully. Visually check all connections and solder joints. Inspect the drag sock, the swivel and spring. Inspect the control cable for wear and make certain all connections are secure. On fixed antenna installations, inspect the fittings for corrosion or wear. Check the antenna wire for broken strands.

g) Check the voltage regulator for proper operation with the engine running. Have it adjusted, if necessary, to prevent voltage in excess of 13.5 when the generator is operating at maximum output.

h) Distributor and spark plug wires should be in good condition. Inspect the terminals to be sure they are clean, bright and fit securely.

7-4 Power Supply Maintenance

The power supply should require little or no maintenance in the field except where the transistors are subjected to severe overload conditions and/or extremely high temperatures. Most failures can be attributed to prolonged operation at near short-circuit conditions which, in turn, will destroy the transistors through excessive internal heating. It is therefore important that the circuitry

external to the power supply be checked thoroughly before operation of a new or repaired power supply is undertaken. If the fault is isolated in the power supply, it should be checked as follows:

a) With the transceiver turned off, remove the back plate from the power supply by removing the five screws. Turn the set upside down.

b) Carefully unsolder the A+ (white) wire from the circuitry and check its resistance to ground. If the resistance is zero in value, the possibility of a shorted Transistor exists.

c) To locate the defective Transistor disconnect the emitter and base wires one at a time until the shorted condition on the A - wire disappears.

d) A shorted diode will pass current in both directions. An open diode will not register in either direction. The current will pass in only one direction if the diodes are not defective. A diode may be checked by unsoldering one end and measuring its forward and backward resistance. Normal ratio should approximate 1:1000 or better.

e) To locate a fault in either of the chokes, unsolder one end and connect it to an ohm meter. If the resistance reading is over 100 ohms, it is defective and should be replaced.

f) To check the filter capacitors, disconnect one end of the capacitor from the circuit. Check the capacitor for normal indications on the ohmeter, i.e. low resistance when starting and increasing in resistance as the capacitor charges to ohmeter internal voltage.

g) The toroid transformer should be checked while the diode leads are removed. Connect the meter from the toroid connection of the high B+ to common. If there is any reading at all, the transformer is defective. When this condition exists the entire power supply should be returned to SunAir for repair.

h) When replacing a defective transistor, use silicone grease between the transistor and the mica insulating washer to give best heat transfer characteristics. Tighten the mounting nut securely.

i) Re-solder all diode, transistor and/or capacitor connections and replace the dust cover.

CAUTION

Reversing polarity of the input voltage will result in transistor damage and will cause a direct short in the power supply.

Important - A Variac should be used for testing various components in the power supply so that voltage can be fed gradually to prevent overloading the components.

7-5 Trouble Locating Guide

When servicing the SunAir Model T-10-D Transceiver, it will be helpful to refer to the block diagrams and schematics on the equipment. In addition, the following list of typical symptoms with probable sources of faults should help to solve many servicing problems.

Transceiver

If the complete transceiver is malfunctioning, the unit should be checked for proper input A+ power and for a blown fuse (F-1). If the fuse is blown, check for one of the following:

a) Short in the A+ input wiring
b) Shorted transistor (defective)
c) Reversed battery polarity on installation
d) Transistor shorted to heat sink (defective insulating washer)

If, with proper A+ to the transceiver, the unit is still malfunctioning, proceed with the following B+ power supply checks:

a) With proper A+ to the B+ power supply, listen for a high frequency "whine" (1500 to 2000 cps) at the power supply. Lack of this "whine" indicates that the transistors are not switching. Check for one of the following causes of trouble:

    1. B+ short to ground
    2. Defective transistors in power supply
    3. Defective component in power supply

b) If power supply whine is present, check for low B+ . The causes of low B+ may be internal (within the power supply) or external (in the load). Check for the following:

    1. External

        Shorted tubes
        Shorted bypass capacitor

    2. Internal

        Defective components (see paragraph 7-4)

Transmitter

Inoperative; no RF output

a) Defective component in oscillator or power supply
b) Defective tube
c) Defective crystal

Operative, but low RF output

a) Defective tube
b) Transmitter out of alignment
c) Low B+ ; see Power Supply checks

Output OK, percent of modulation low

a) Defective transistor in audio amplifier stage . Refer to Receiver checks.
b) Defective microphone
c) Defective components in modulation circuit
d) Defective relay
e) Low microphone voltage

Modulation distorted

a) Check receiver audio amplifier stage

Output and modulation OK, frequency out of tolerance

a) Defective component(s) in oscillator driver stage
b) Defective crystal

Receiver

Inoperative, no audio

a) Check transistors and components in audio amplifier stage

Inoperative, but loud hiss at maximum volume

a) Defective tube

Receiver operative, but low sensitivity

a) Defective tube
b) Defective diode in detector, noise limiter or AVC circuit
c) Open coil in RF or mixer stage
d) Receiver out of alignment
e) Defective volume control

Receiver operative, but audio distorted

a) Defective diode in detector, noise limiter or AVC circuit
b) Defective transistor or component in audio amplifier circuit

Modulation distorted

a) Check receiver audio amplifier stage

Output and modulation OK, frequency out of tolerance

a) Defective component(s) in oscillator driver stage
b) Defective crystal

Receiver

Inoperative, no audio

a) Check transistors and components in audio amplifier stage

Inoperative, but loud hiss at maximum volume

a) Defective tube

Receiver operative, but low sensitivity

a) Defective tube
b) Defective diode in detector, noise limiter or AVC circuit
c) Open coil in RF or mixer stage
d) Receiver out of alignment
e) Defective volume control

Receiver operative, but audio distorted

a) Defective diode in detector, noise limiter or AVC circuit
b) Defective transistor or component in audio amplifier circuit

7-6 Sun-Air 10-Channel Test Set

The Sun-Air-designed 10-Channel Test Set is a compact, easy-to-use servicing unit. Ordinary bulky test panels and intricate wiring are outmoded by this unit.

This test set, when used with a high-frequency wattmeter, a vacuum tube voltmeter and a high-frequency signal generator, is recommended for complete servicing of all SunAir 10-channel transceivers.

The test set is 7 1/4 inches wide, 5 1/2 inches deep and 4 3/4 inches high. It has an aluminum front panel and a black finished dust cover.

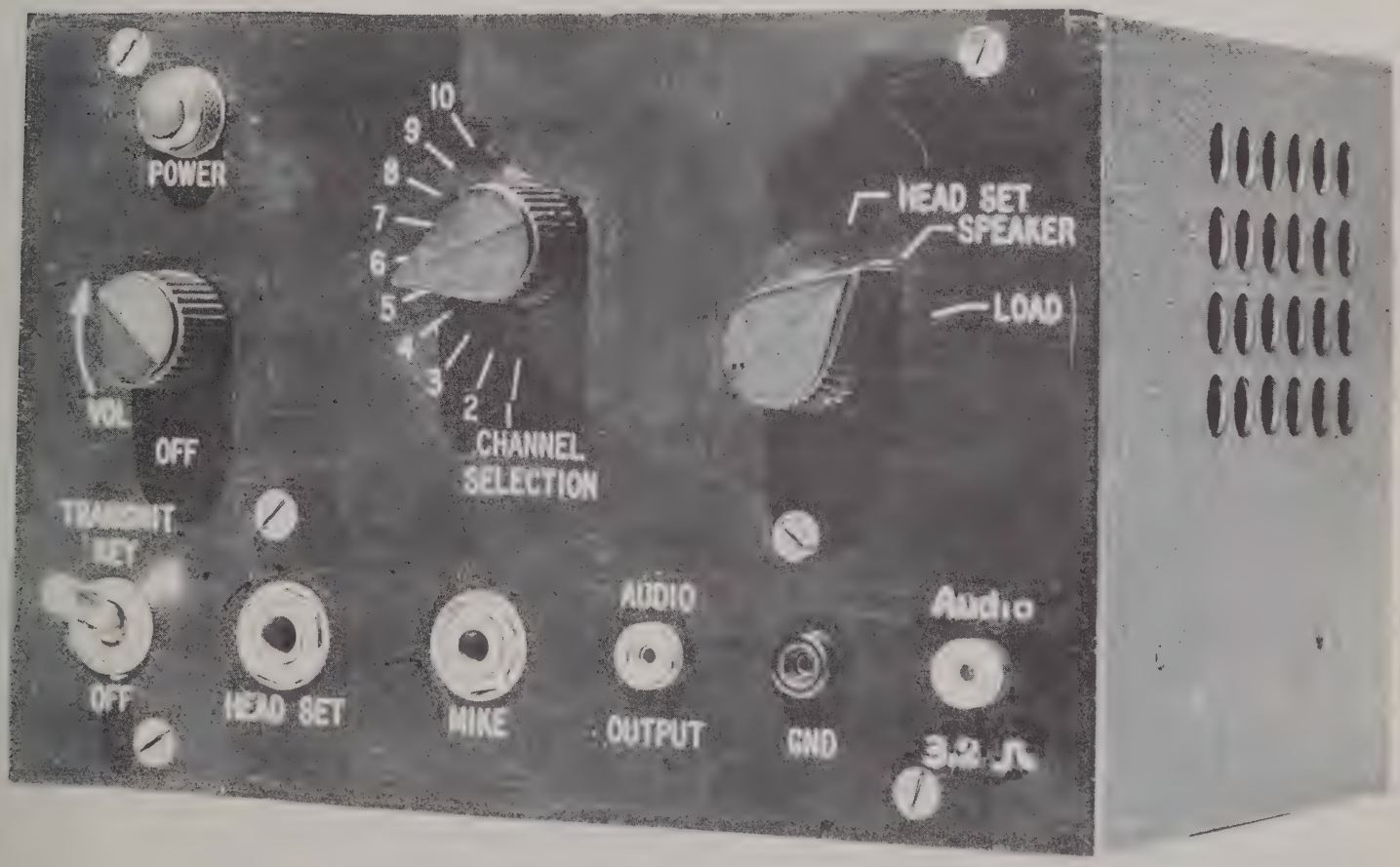


Fig. 7-1. Front view Test Set showing controls

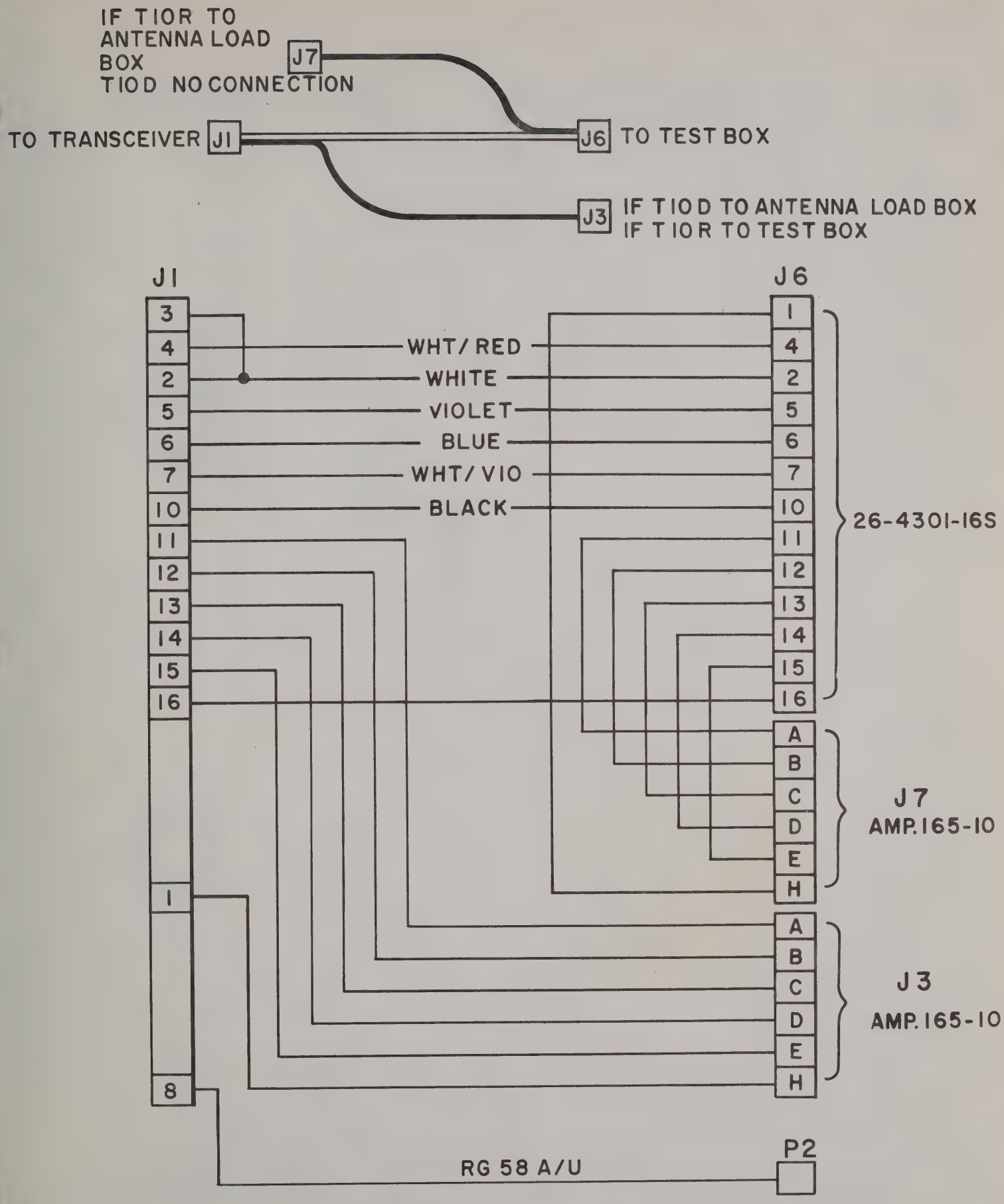
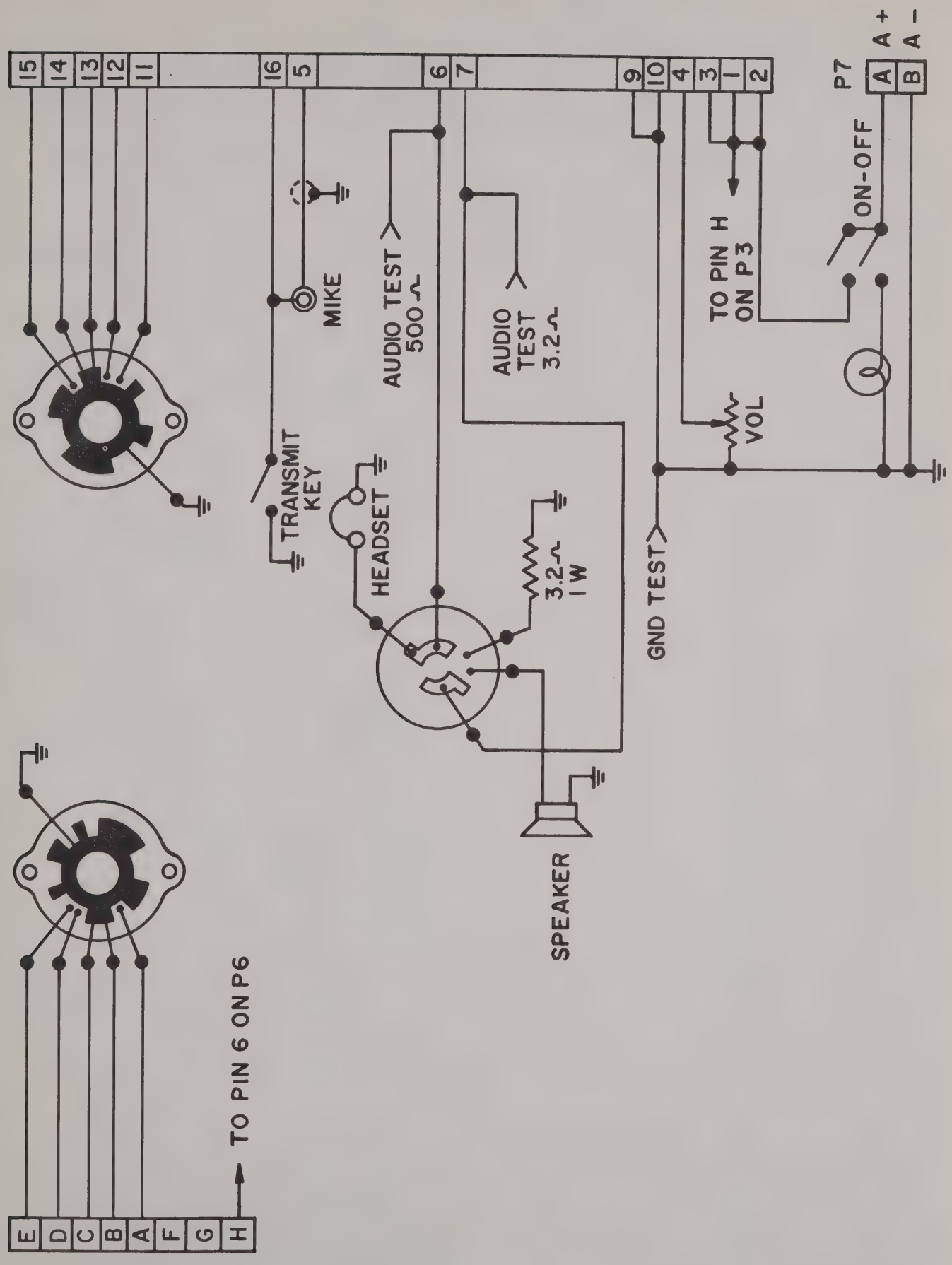


Fig. 7-2. Cable Assembly, T-10-D and T-10-R Test Set



7-3. Schematic, T-10-D and T-10-R Test Set

SECTION VIII
PARTS LIST

Circuit Symbol	Description	Mfgr. Symbol	SunAir Part No.
C1	Tubular, ceramic, 250 mmf 500V	ER	24238
C2	Tubular, ceramic, 510 mmf 500V	ER	24197
C3, C5, C7, C9, C11	Tubular, ceramic, capacity depends on frequency	-	*
C13	Disc, ceramic, .1 mf 75V	ER	24408
C14	Disc, ceramic, .01 mf 500V	ER	24355
C15	Disc, ceramic, .01 mf 500V	ER	24355
C16	Disc, ceramic, .01 mf 500V	ER	24355
C17	Tubular, ceramic, 12 mmf 500V	ER	24329
C18	Disc, ceramic, .01 mf 500V	ER	24355
C19	Disc, ceramic, .01 mf 500V	ER	24355
C20, C22, C24, C26, C28	Tubular, ceramic, capacity depends on frequency	-	*
C30	Disc, ceramic, .01 mf 500V	ER	24355
C31	Tubular, ceramic, 12 mmf 500V	ER	24329
C32	Disc, ceramic, .01 mf 500V	ER	24355
C33	Disc, ceramic, .01 mf 500V	ER	24355
C34	Disc, ceramic, 220 mmf 500V	ER	24018
C35	Disc, ceramic, .1 mf 75V	ER	24408
C36	Disc, ceramic, .01 mf 500V	ER	24355
C37	Disc, ceramic, .01 mf 500V	ER	24355
C38	Disc, ceramic, 220 mmf 500V	ER	24018
C39	Disc, ceramic, 220 mmf 500V	ER	24018
C40	Disc, ceramic, .05 mf 500V	ER	24367
C41	Tubular, ceramic, 32 mmf 500V	ER	24305
C42	Disc, ceramic, 68 mmf 1.5KV	ER	24379
C43	Electrolytic, 10 mf 25V	SP	24628
C44	Tantalum, 100 mf 30V	IC	24587
C45	Disc, ceramic, .1 mf 75V	ER	24408
C46			
C47	Electrolytic, 2 mf 35V	SP	24836
C48			
C49			
C50	Disc, ceramic, .05 mf 500V	ER	24367
C51			
C52	Disc, ceramic, .01 mf 500V	ER	24355
C53	Tubular, ceramic, 12 mmf 500V	ER	24329
C54	Tubular, ceramic, 100 mmf 500V	ER	24252
C55	Tubular, ceramic, 100 mmf 500V	ER	24240

* Specify frequency when ordering

Circuit Symbol	Description	Mfgr. Symbol	SunAir Part No.
C56	Tubular, ceramic, 100 mmf 500V	ER	24240
C57	Disc, ceramic, .05 mf 500V	ER	24393
C58	Disc, ceramic, .01 mf 500V	ER	24355
C59	Disc, ceramic, 1500 mmf 3KV	ER	24381
C60			
C61	Disc, ceramic, 1500 mmf 3KV	ER	24381
C62	Disc, ceramic, .01 mf 1.6KV	ER	24410
C63	Disc, ceramic, 47 mmf 1 KV	ER	24056
C64	Disc, ceramic, .01 mf 500V	ER	24355
C65, C67, C69, C71, C73	Tubular, ceramic, capacity depends on frequency	-	*
C75	Disc, ceramic, .01 mf 500V	ER	24355
C76, C77, C78, C79, C80	Disc, ceramic, capacity depends on frequency	-	*
C81, C82, C83, C84, C85	Tubular, ceramic, capacity depends on frequency	-	*
C86, C88, C89, C91, C92, C94, C95, C97, C98			
C100	Disc, ceramic, capacity depends on frequency	-	*
C101	Disc, ceramic, .01 mf 500V	ER	24355
C102	Tantalum, 100 mf 30V	IC	24587
C103	Tantalum, 100 mf 30V	IC	24587
C104	Electrolytic, 8 mf 350V	IC	24551
C105	Electrolytic, 8 mf 350V	IC	24551
C106	Electrolytic, 8 mf 350V	IC	24551
C107	Mylar, .5 mf 200V	SE	24513
C4, 6, 8, 10, 12, 21, 23, 25, 27, 29, 66, 68, 70, 72, 74, 87, 90, 93, 96, 99	Variable ceramic trimmers, 9-35 mmf	ER	24783

* Specify frequency when ordering

8.2 Resistors

Circuit Symbol	Description	Mfgr. Symbol	SunAir Part No.
R1	Carbon, 22K ohm 1/2W	SC	16712
R2	Carbon, 1 Meg ohm 1/2W	SC	16633
R3	Carbon, 68 ohm 1/2W	SC	16774
R4	Carbon, 100K ohm 1/2W	SC	16671
R5	Carbon, 100K ohm 1/2W	SC	16671
R6	Carbon, 22K ohm 1/2W	SC	16712
R7	Carbon, 1K ohm 1/2W	SC	16748
R8	Carbon, 1 Meg ohm 1/2W	SC	16633
R9	Carbon, 33K ohm 1/2W	SC	16695
R10	Carbon, 680 ohm 1/2W	SC	16750
R11	Carbon, 47K ohm 1/2W	SC	16683
R12	Carbon, 1K ohm 1/2W	SC	16748
R13	Carbon, 1 Meg ohm 1/2W	SC	16633
R14	Carbon, 270 ohm 1/2W	SC	16762
R15	Carbon, 100K ohm 1/2W	SC	16748
R16	Carbon, 1 Meg ohm 1/2W	SC	16633
R17	Wire Wound, 10K ohm 4W	WL	16255
R18	Carbon, 100K ohm 1/2W	SC	16671
R19	Carbon, 100K ohm 1/2W	SC	16671
R20	Carbon, 270K ohm 1/2W	SC	16762
R21	Carbon, 820K ohm 1/2W	SP	16437
R22	Carbon, 1 Meg ohm 1/2W	SC	16633
R23	Wire Wound, 450 ohm 3W	ME	16281
R24	Wire Wound, 1K ohm 3W	ME	16279
R25	Carbon, 220K ohm 1/2W	SC	16231
R26	Carbon, 1K ohm 1/2W	SC	16748
R27			
R28	Carbon, 2.7K ohm 1/2W	SC	16578
R29	Carbon, 270 ohm 1W	SC	16762
R30	Carbon, 10 ohm 2W	SC	16384
R31	Carbon, 10K ohm 1/2W	SC	16724
R32	Wire Wound, 1 ohm 5W	OM	16968
R33	Wire Wound, 15 ohm 3W	-	16234
R34	Wire Wound, 1K ohm 3W	TO	16279
R35	Wire Wound, 1 ohm 5W	OM	16968
R36	Carbon, 270 ohm 1/2W	SP	16762
R37	Carbon, 27K ohm 1W	SC	16700
R38	Carbon, 33K ohm 1/2W	SC	16695
R39	Carbon, 47K ohm 1/2W	SC	16683
R40	Carbon, 1 Meg ohm 1/2W	SC	16633

Circuit Symbol	Description	Mfgr. Symbol	SunAir Part No.
R41	Carbon, 47 ohm 1/2W	SC	16798
R42	Carbon, 27K ohm 1W	SC	16504
R43	Wire Wound, 100 ohm 10W	LI	16152
R44	Wire Wound, 30K ohm 5W	LI	16009
R45	Carbon, 1K ohm 1/2W	SC	16748
R46	Wire Wound, 470K ohm 1W	SC	16463
R47	Wire Wound, 1K ohm 3W	ME	16279
R48	Wire Wound, 40 ohm 3W	ME	16310
R49	Carbon, 100 ohm 3W	MO	16308
R50	Wire Wound, 1 ohm 5W	OM	16968
R51	Wire Wound, 1 ohm 5W	OM	16968
R53	Potentiometer, 2.5K ohm 2W	CT	32261
R47) 28V Units	Wire Wound, 450 ohm 3W	ME	16281
R52)	Wire Wound, 10 ohm 3W	ME	16322

8-3 Transistors

Q1	2N1379	TI	44056
Q2	1732	CV	44070
Q3, Q4	2N1165	CV	44018
Q5, Q6	2N1165 (14V)	MA	44018
Q5, Q6	2N174 (28V)	MA	44020

8-4 Transformers

T1	IF Input	AM	48038
T2	IF Output	AM	48040
T3	Microphone	IT	48048
T4	Driver	IT	48076
T5	Modulation	IT	48064
T6	Power Transformer & Circuit Board (14V)	SA	90029
T6	Power Transformer & Circuit Board (28V)	SA	90031

Circuit Symbol	Description	Mfgr. Symbol	SunAir Part No.
V1	12BA6	RC	76217
V2	12BE6	RC	76205
V3	12BA6	RC	76217
V4	12BH7A	RC	76190
V5	6883	RC	76229

8-6 Coils and Chokes

L1 thru L5	RF Coils (No. dep. on Freq.)	-	*
L6 thru L10	Mixer Coils (No. dep. on Freq.)	-	*
L11 thru L15	Oscillator Coils (No. dep. on Freq.)	-	*
L16 thru L20	PA Coils (No. dep. on Freq.)	-	*
L21 thru L26	Harmonic Traps (No. dep. on Freq.)	-	*
L27	RF Choke, 2.5mh 300ma	NR	56061
L28	Choke, .4mh 10 amp	SA	56059
L29	Choke, 10mh 300ma	SA	56152
L30	Choke, 400 mh 200ma	SA	56023

8-7 Diodes

CR4 thru CR7	CER73	SO	40103
CR1 and CR3	CSD2648	CV	40127
CR2	IN34A	SL	40024

8.8 Electric Reel Kit

	Swivel Snap - 90# test	PI	71073
	Drag Cup Spring	AA	71085
	Bobbin N-235	SA	71097
	Drive Shafting	SA	71102
	Plug PL 112	SA	71114
	Reel	SA	71126

* Specify frequency when ordering

Circuit Symbol	Description	Mfgr. Symbol	SunAir Part No.
	Motor with gear box (28V)	SA	71138
	Motor with gear box (14V)	SA	71140
	Insulator, ceramic	AA	71152
	Drag Cup	AA	71164
	Fairlead (18")	SA	71176
	Cable Cap	SA	74312

8.9 Manual Reel Kit

	Swivel	PI	71073
	Insulator, ceramic	AA	71152
	Drag Cup	AA	71164
	Fairlead (18")	SA	71176
	Bobbin	SA	71188

8.10 Fixed Antenna Kit

	Wire	CM	58863
	Bracket, wing tip	SA	71009
	Mast Bracket	Cessna	71011
	Insulator #463	BR	71023
	Insulator #4125	BR	71035

8-11 Relays

K1	Audio Changeover	DE	66066
K2	Antenna Relay	DE	66078
K3	B+ Changeover	DE	66080

Circuit Symbol	Description	Mfgr. Symbol	SunAir Part No.
8-12 Fuses			
F1	10 amp (28-volt transceiver)	LF	84886
	15 amp (14-volt transceiver)	LF	84874
8-13 Miscellaneous and Accessories			
	Plug, 16-pin, chassis	AB	74099
	Jack, 16-pin, dust cover	AB	74084
	Light Assembly with bulb	GR	84329
	Bulb (12V)	CH	84376
	Bulb (28V)	CH	84355
	Knob, On-off, Volume	CT	32261
	Knob, Index	RA	32106
	Microphone	EL	84006
	Headset	MU	84020
	Headset	TE	84018
	RF Inverter	SA	11554
	RF Indicator and Bracket	SA	11542
	RF Indicator	IE	84379
	Motor, Ledex	LE	32285
	Face Plate, Plexiglas	SA	11566
	Dust Cover	SA	11463
	Power Supply, Complete	SA	11504
	Card Holder	SA	11786

SECTION IX

DIFFERENCE DATA

BETWEEN T-10-D and T-10-R

9-1 Purpose

The purpose of this addendum is to provide technical information relative to the T-10-R Transceiver The T-10-R is the remote control version of the SunAir ten-channel Transceiver. The areas of difference between the T-10-D and T-10-R are called out in the following paragraphs and are shown in the included photographs and diagrams.

9-2 Dimensions

Overall dimension: The overall dimensions of the T-10-R are shown on the diagram Fig. 9-2. Also included as part of the radio set is the shock mount, Fig. 9-3. The shock mount is equipped with the disconnect plug in the rear. Interconnection cables are not included with the T-10-R since lengths and layout is dependent on the individual installation. A wiring diagram is shown in Fig. 9-4.

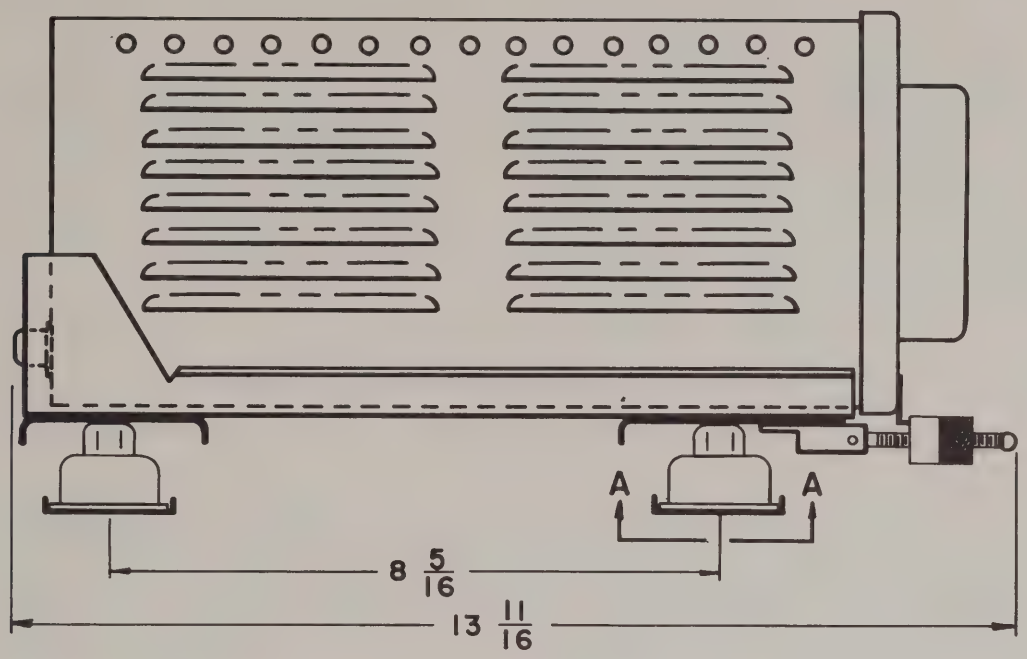
9-3 Transceiver Controls

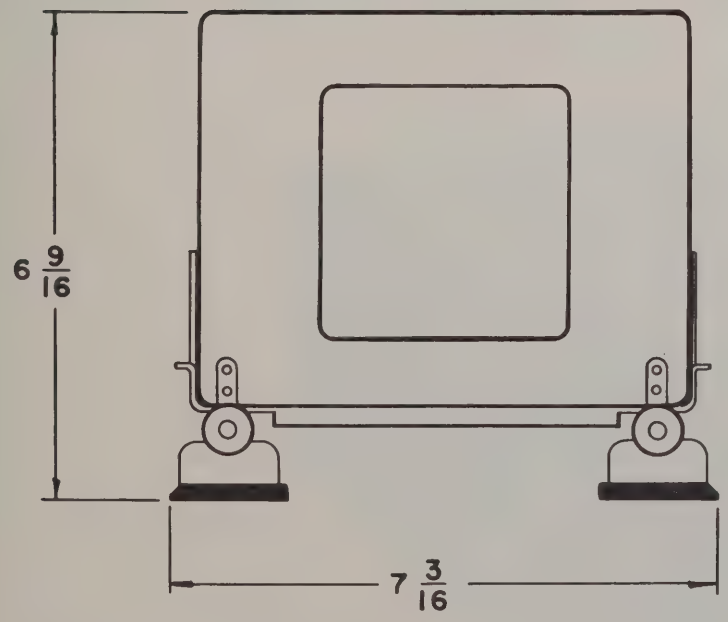
Remote control: Two types of remote control heads are available for use with the T-10-R. The control heads, basically, are the same in operation; the only difference is in the display of the selected channel number. One control head (drum type) displays the channel number by rotating a drum under the display window. The second (digital type) rotates drums, perpendicular to the window face, thus causing the selected channel number to appear in the window. The channel selector knob in both control heads positions the water rotors of two switch sections. Switching of the T-10-R is accomplished in the same manner with either control head. A second control in the remote head is the on-off switch, volume control.

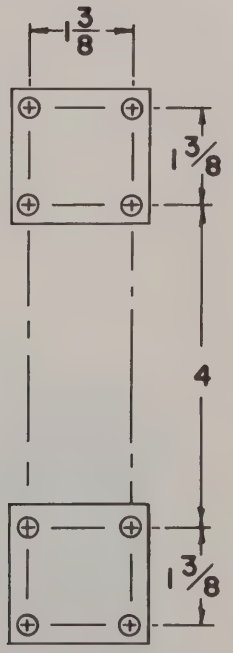
9-4 General Operating Procedure

Channel selection: Located on the main chassis assembly of the T-10-R is a ledex type Solenoid motor. The ledex motor rotates the main channel selector switches. See Fig. 9-5. The first wafer section (S1-8) controls the homing of the ledex motor. This wafer section is a negative of the wafer sections in the control head. When the ledex motor rotates the wafer sections to the channel selected at the control head, the ground path to the ledex motor will be interrupted by the wafer S1-8. The ledex motor will then stop. When a different channel is selected at the control head, a new ground path for the ledex motor is provided. The ledex motor will then rotate to the new position where this ground path will be interrupted.

A wire saving system is employed in the control circuitry. Only five wires are used to control the selection of 10 channels.







SECTION A-A

No. 10032, 9-1-61 S.T.A.

T-10-R, T-5-RA OVERALL DIMENSIONS

The second wafer in the control head coordinates the LU series load with the transceiver. Operation of the ledex motor in the load unit is the same as in the radio set. The wire saving, five wire system is used.

9-5 Power Control

Operation power control: The on-off switch provides a ground connection to K-4, the on-off relay located within the transceiver. The relay K-4 may be seen in the upper right corner of Fig. 9 -1

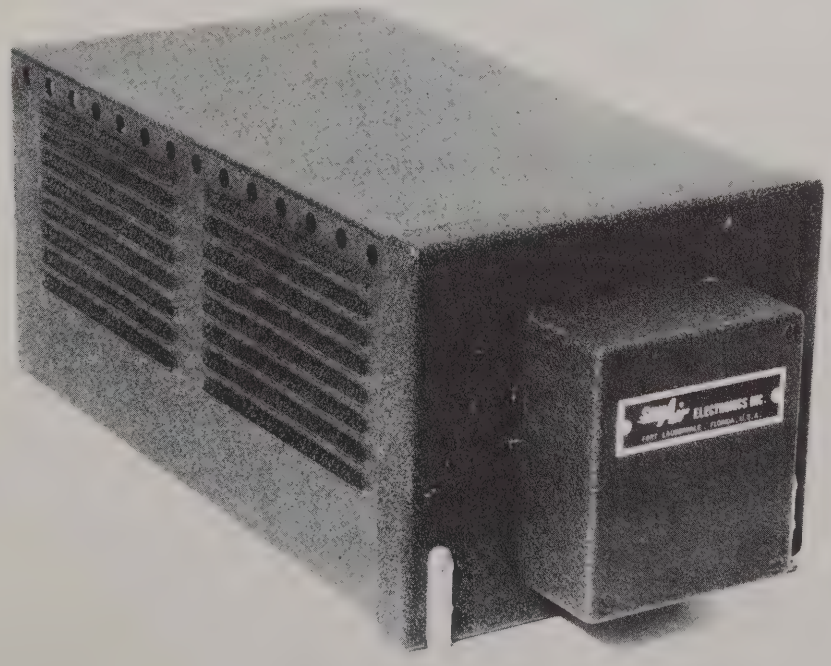
9-6 Volume Control

Volume control: The volume control is a 2.5 K ohm potentiometer. Control is obtained by varying the gain of the RF stages within the receiver section. This is accomplished by changing the amount of resistance in the cathode circuit of V1 and V3. The clockwise end of the volume control potentiometer is grounded. The rotor of the potentiometer is connected to pin 4 of P 1 and from there to the cathodes of V1 and V3. As the control is rotated clockwise, the resistance in the circuit decreases and the RF gain increases.

9-7 R F Meter

RF Indicator: A panel meter is supplied with the T-10-R radio set. See Fig. 9-6

The meter is used in conjunction with the RF inverter or standing wave ratio detector. The meter provides an indication of antenna current as described in Section 5-5.



Front view of SunAir T-10- R

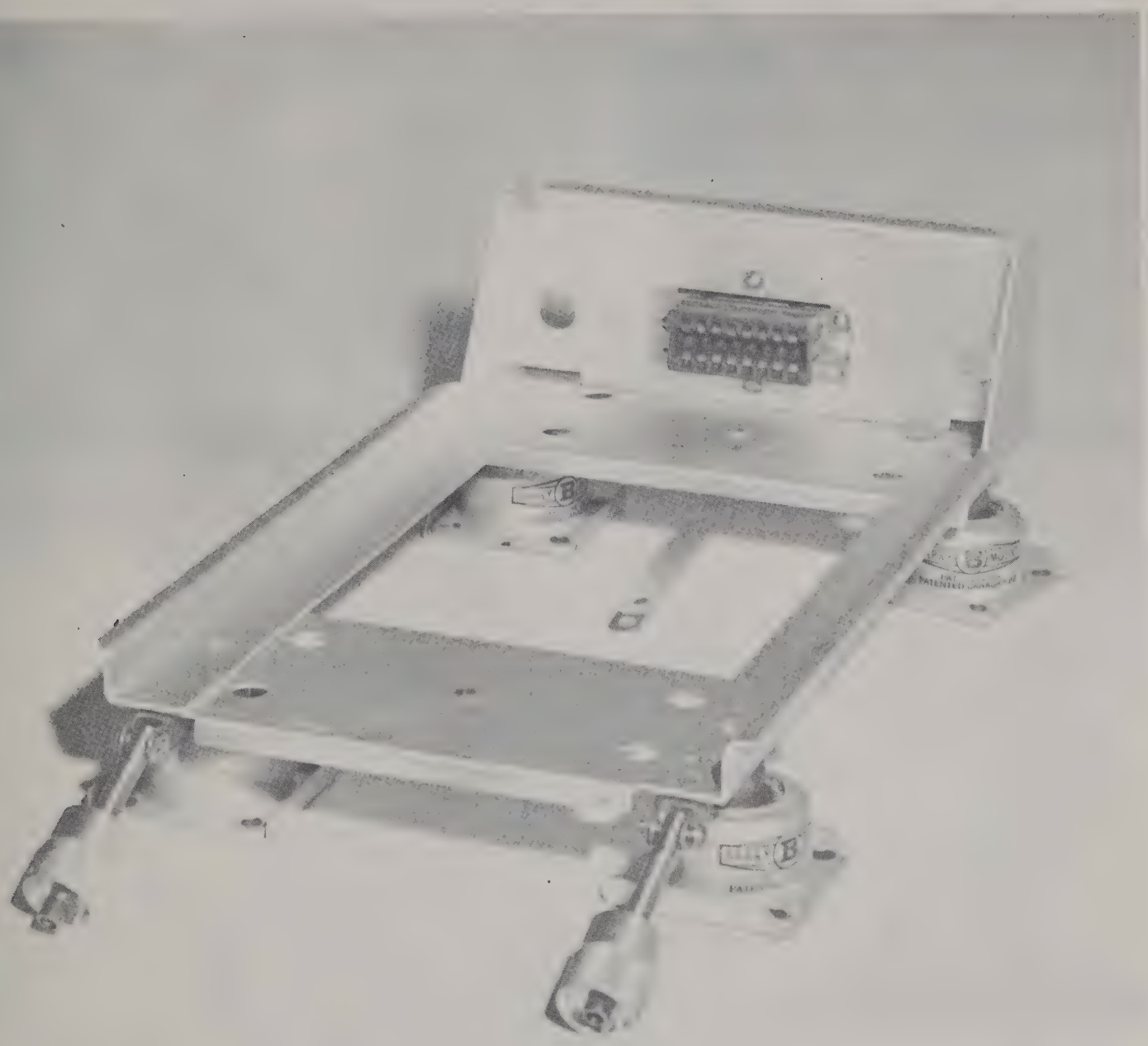
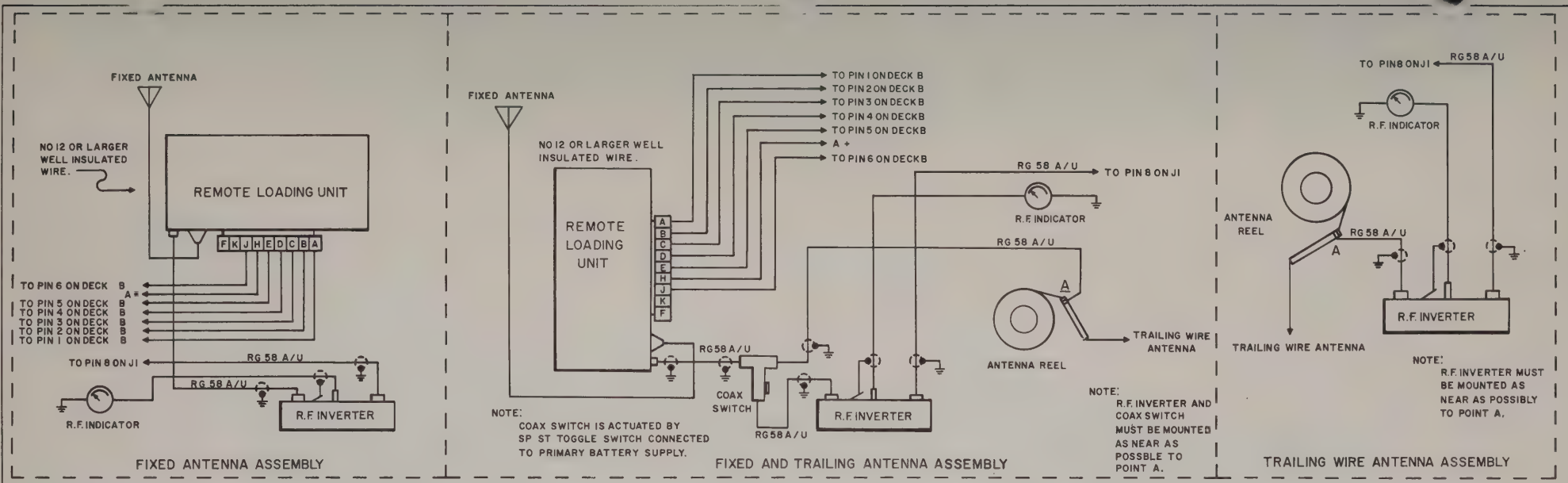
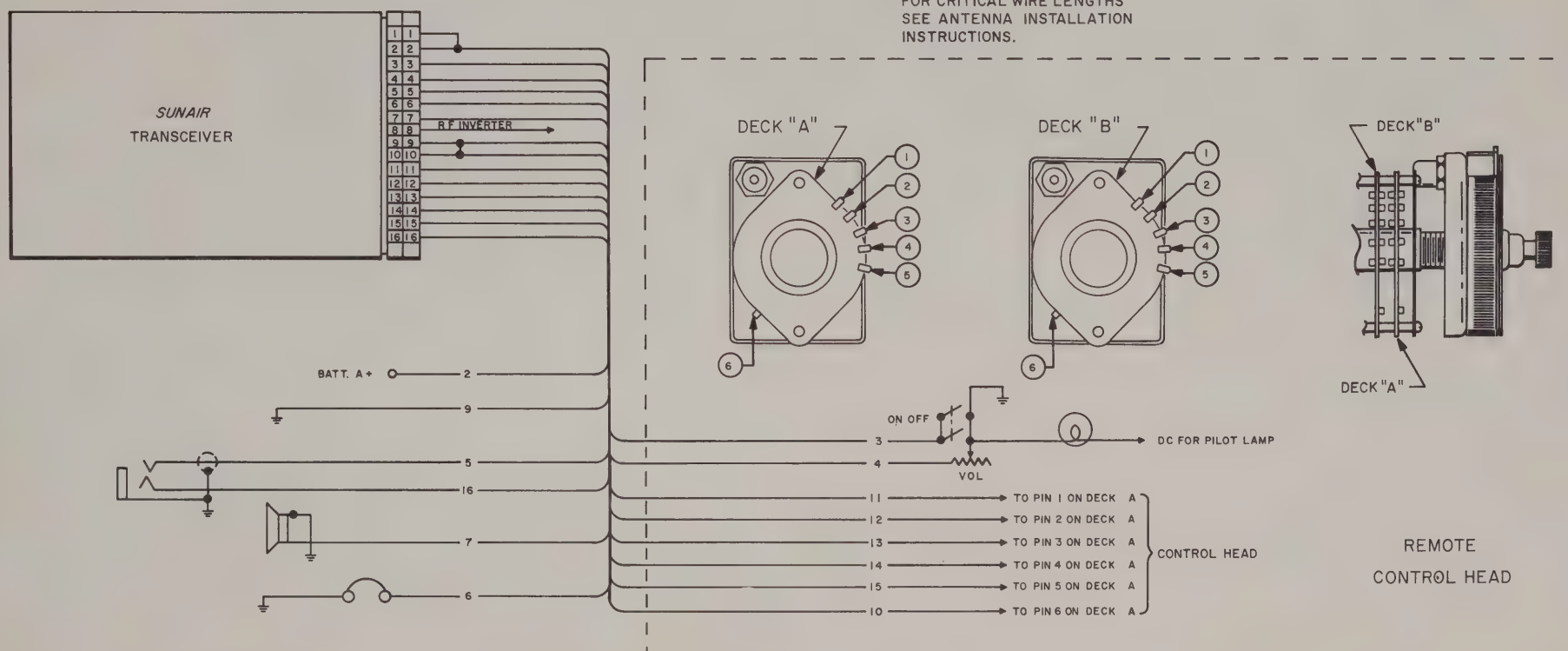


Fig. 9-3 T-10-R Shock Mount



NOTE:
FOR CRITICAL WIRE LENGTHS SEE ANTENNA INSTALLATION INSTRUCTIONS.



REMOTE CONTROL HEAD AND RELATIONSHIP OF ACCESSORIES USED WITH SUNAIR T-10-R AND T-5-RA TRANSCEIVER.

NO.10020, 8-10-61 S.T.A.

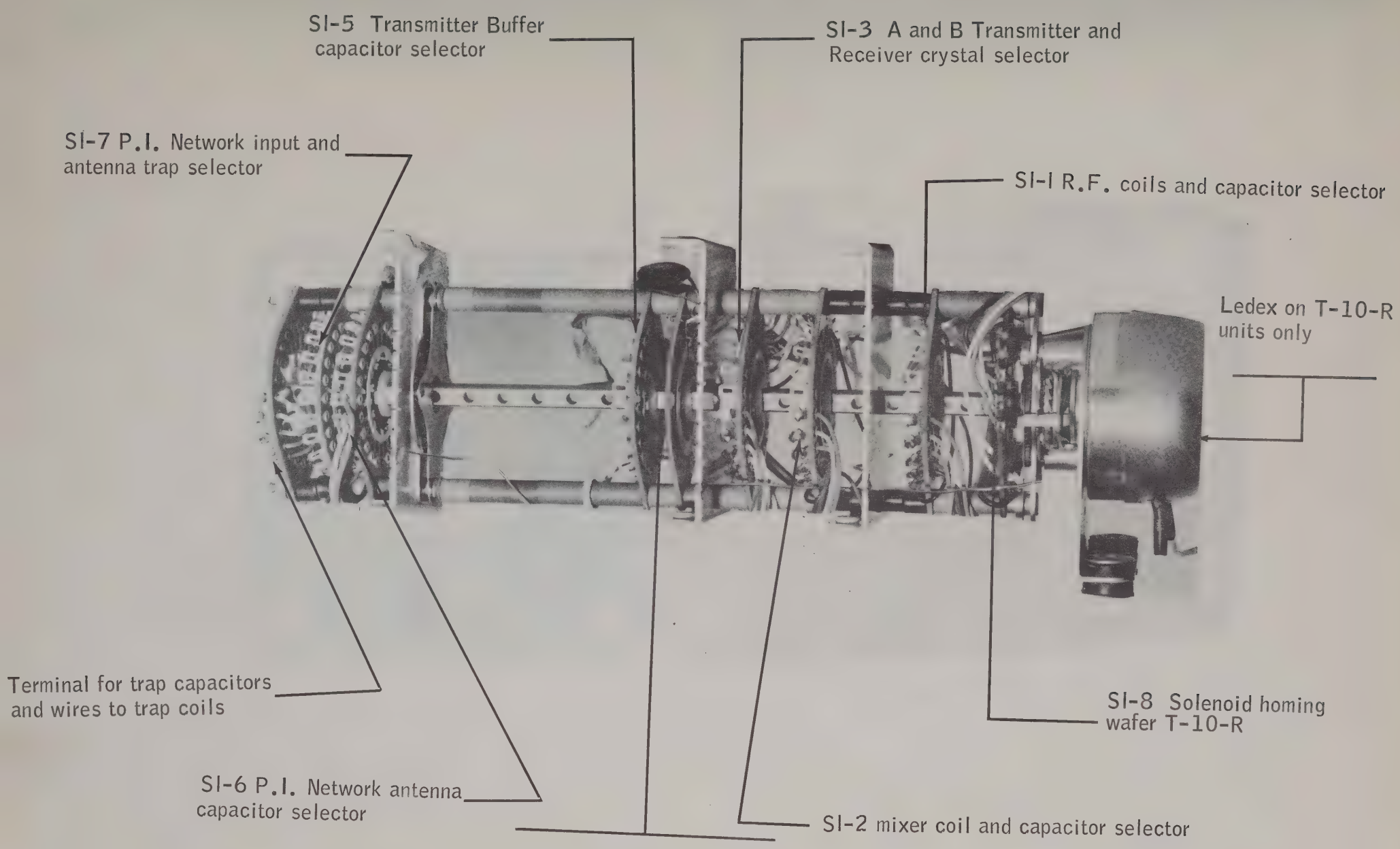
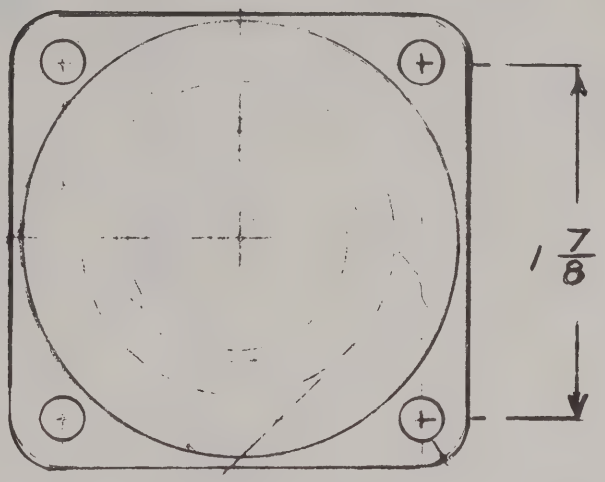


Fig. 9-5 T-10-R Switching Wafer Locations and Functions



RF Indicator mounting centers

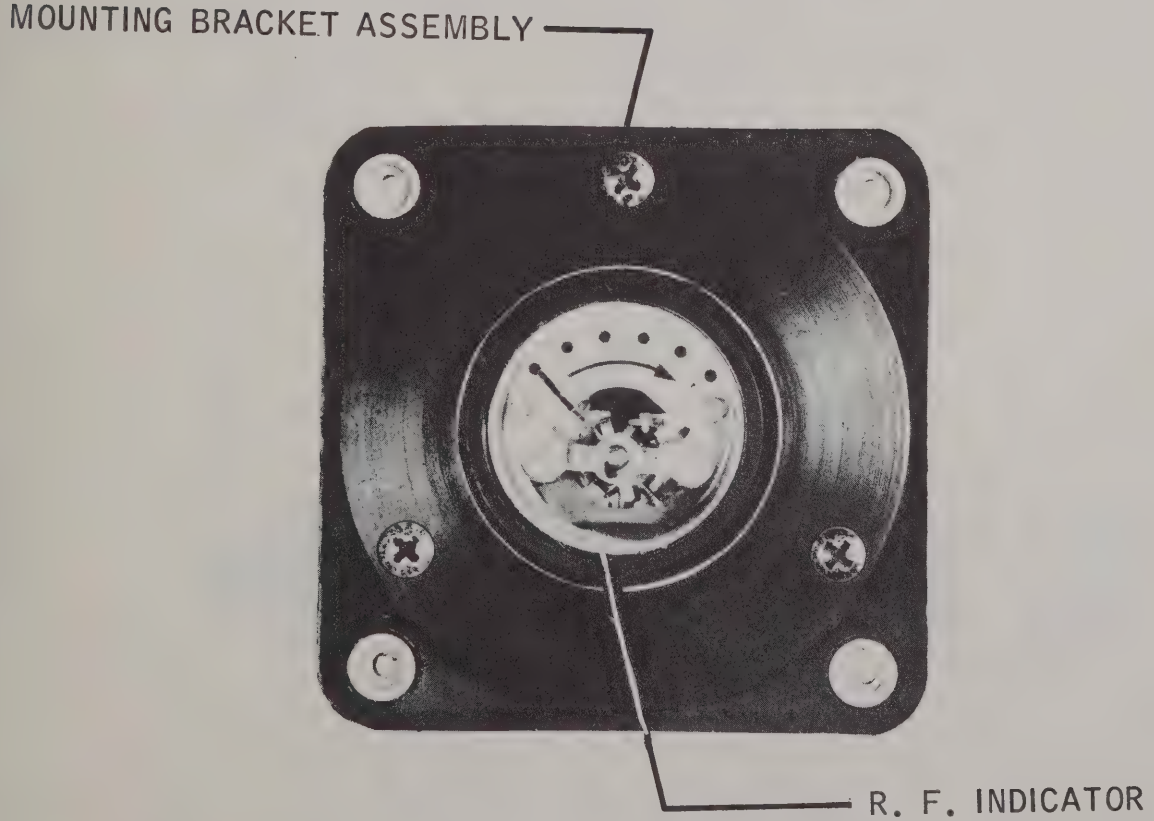
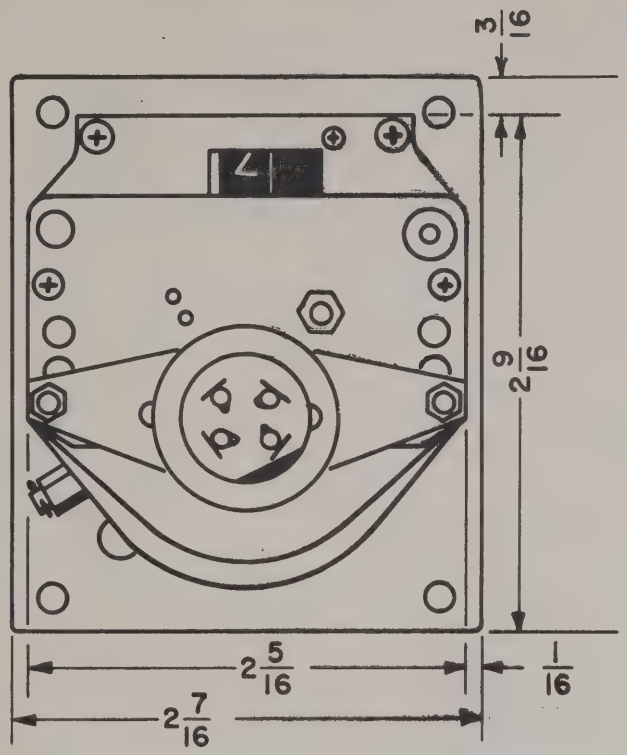
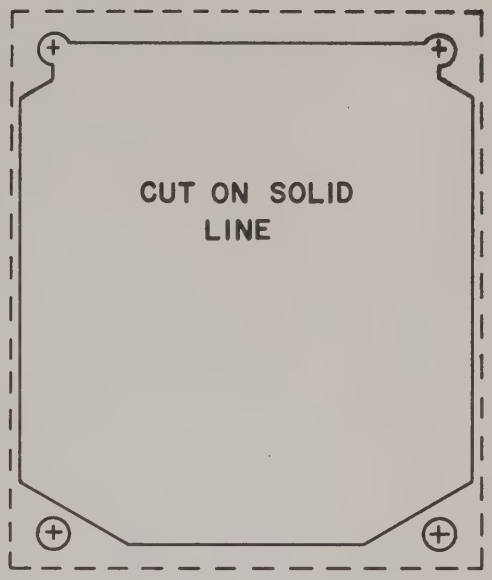


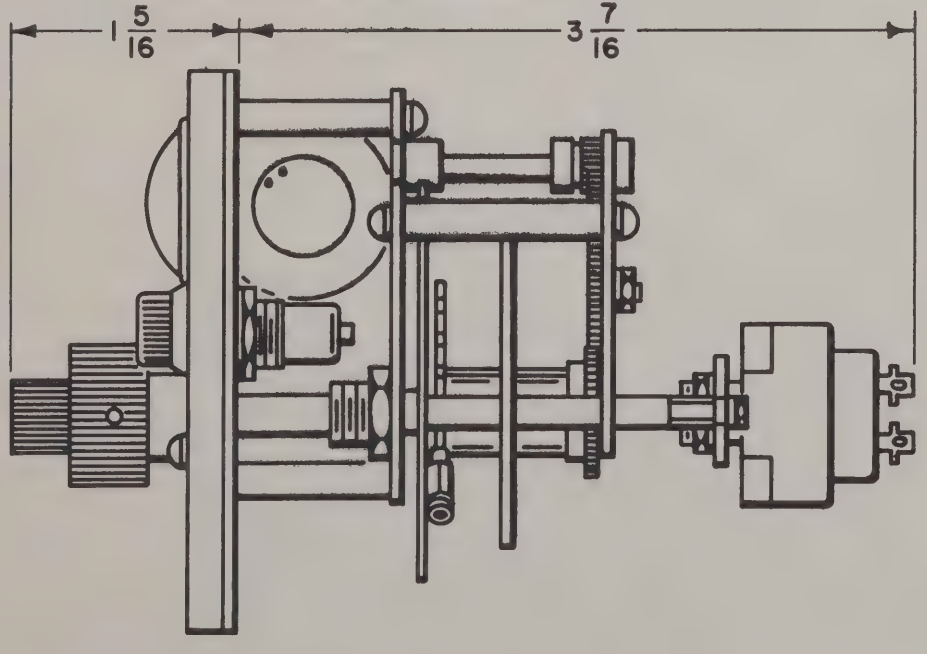
Fig. 9-6 R.F. Indicator





DRILL TEMPLATE

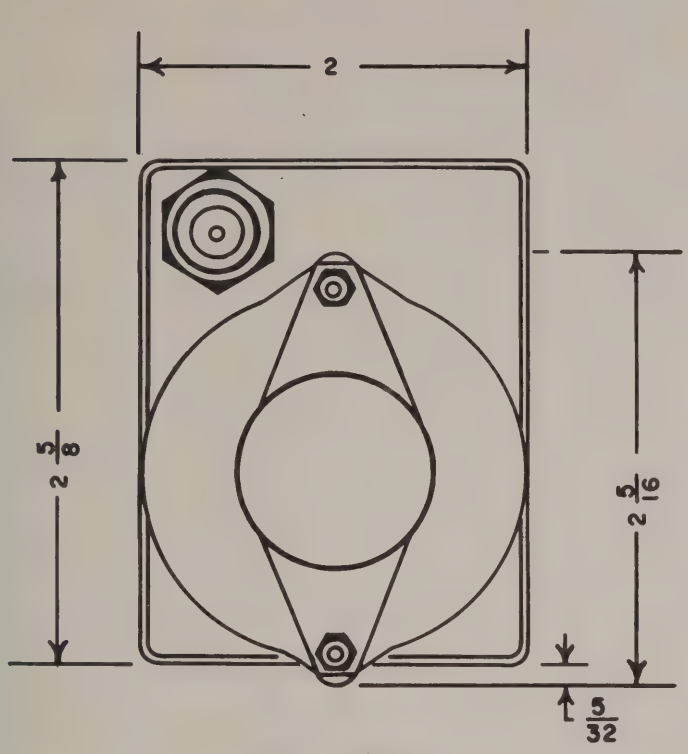
ORDERING INFORMATION	
FOR TRANSCEIVER MODEL No.	CONTROL HEAD PART No.
T-5-RA	32405
T-10-R	32405 (REMOVE 5 CHAN. STOP)
T-22-RA	32003
T-22-R	32027



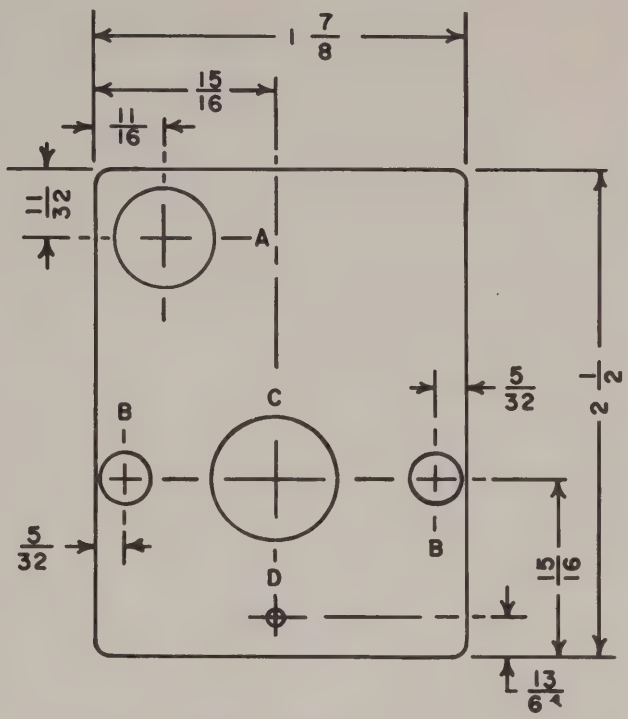
WEIGHT: 10 oz.

ORDERING INFORMATION
9/22/61 SA.
S-292 11/22/60 JWS

CONTROL HEAD, DIGITAL TYPE



REAR VIEW



DRILL NOTES:

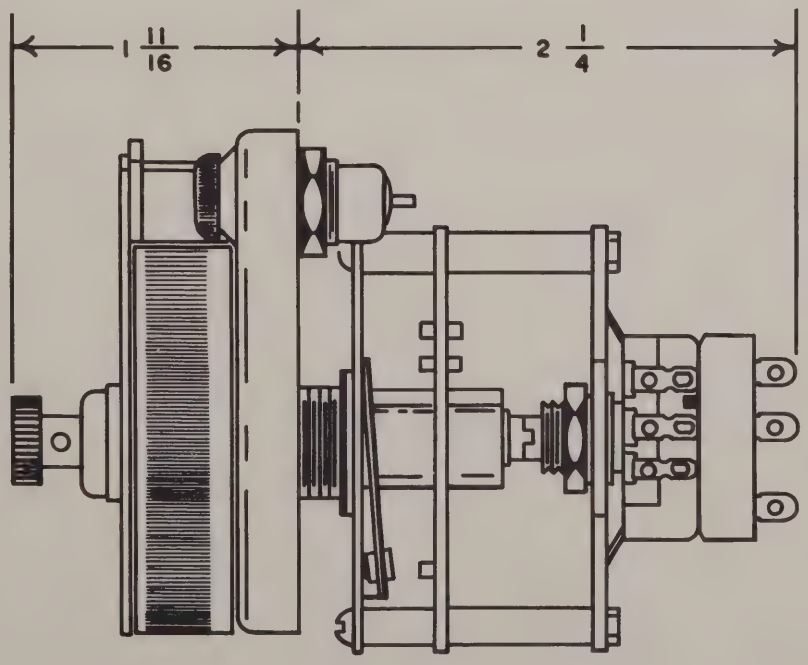
A-1/2 IN. DRILL (1)

B-1/4 IN. DRILL (2)

C-5/8 IN. DRILL (1)

D-TAP DRILL NO. 47 TAP 3-48

ORDERING INFORMATION	
FOR TRANSCEIVER MODEL No.	CONTROL HEAD PART No.
T-5-RA	32338
T-10-R	32338 (REMOVE 5 CHAN. STOP)
T-22-RA	32015
T-22-R	32039



WEIGHT: 7 OZ.

ORDERING INFORMATION
9/22/61 SA.
S-183 11/23/60 JS.

DRUM TYPE INSTALLATION & OVER-ALL DIMENSIONS

NOTES:

1 ALL RELAYS

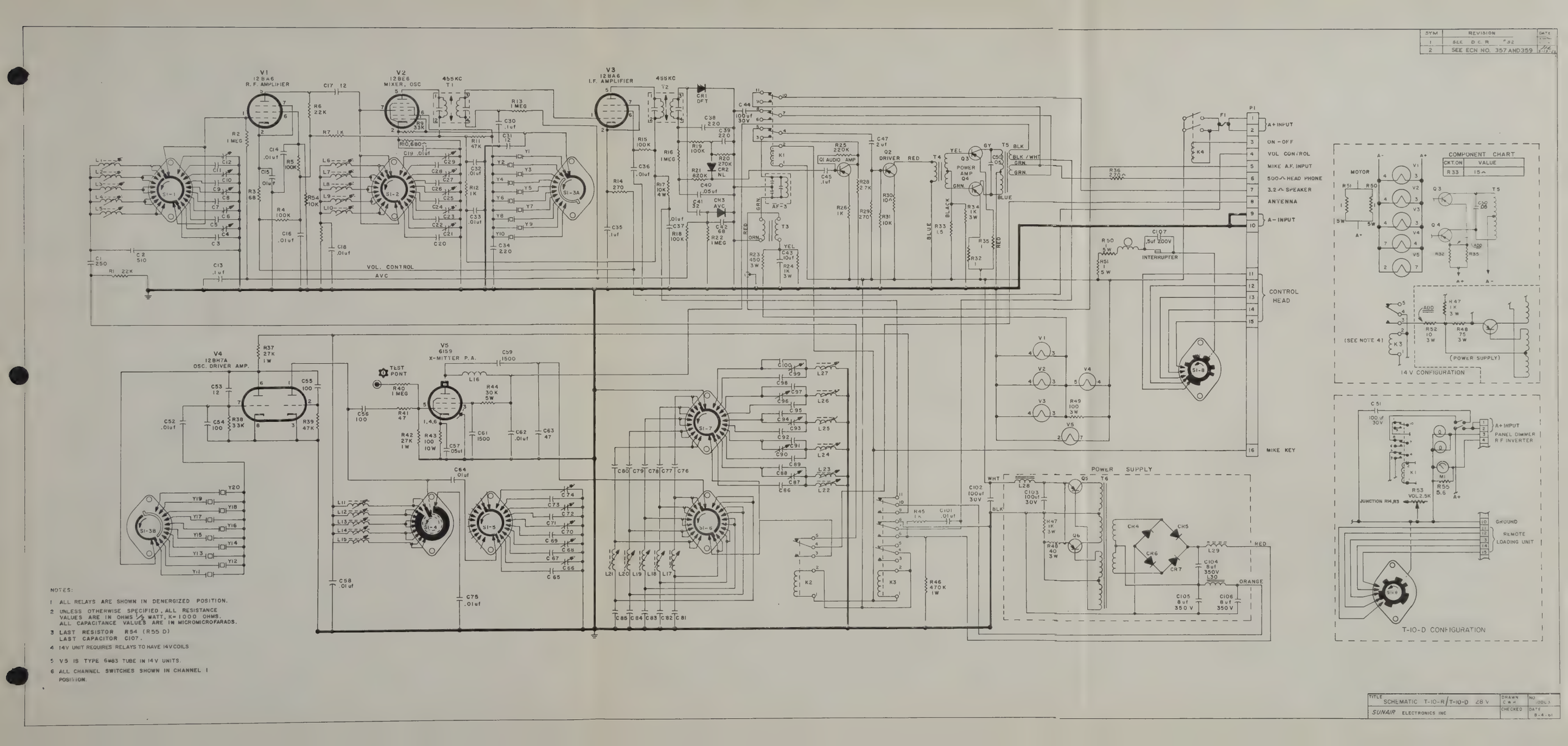
2 UNLESS OTH
VALUES ARE
ALL CAPACIT

3 LAST RESIS
LAST CAPA

4 14V UNIT REQU

5 V5 IS TYPE

6 ALL CHANNEL
POSITION.



SYM	REVISION	DATE
1	SEE D.C.R. #32	
2	SEE ECN NO. 357 AND 359	11/5/61

NOTES:

1 ALL RELAYS ARE SHOWN IN DENERGIZED POSITION.

2 UNLESS OTHERWISE SPECIFIED, ALL RESISTANCE VALUES ARE IN OHMS ½ WATT, K=1000 OHMS. ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS.

3 LAST RESISTOR R54 (R55 D)
LAST CAPACITOR C107.

4 14V UNIT REQUIRES RELAYS TO HAVE 14VCOILS

5 V5 IS TYPE 6W83 TUBE IN 14 V UNITS.

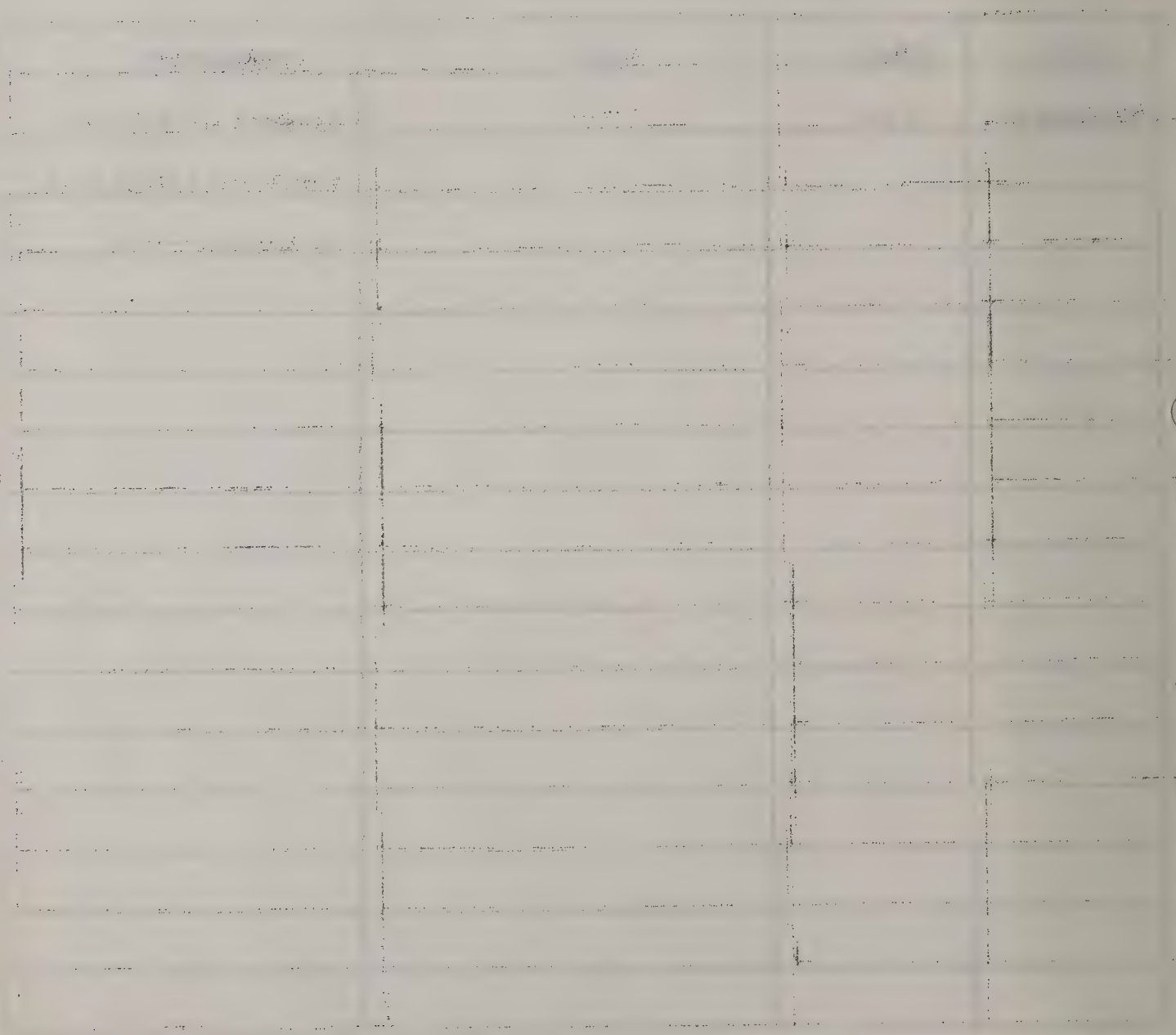
6 ALL CHANNEL SWITCHES SHOWN IN CHANNEL 1 POSITION.

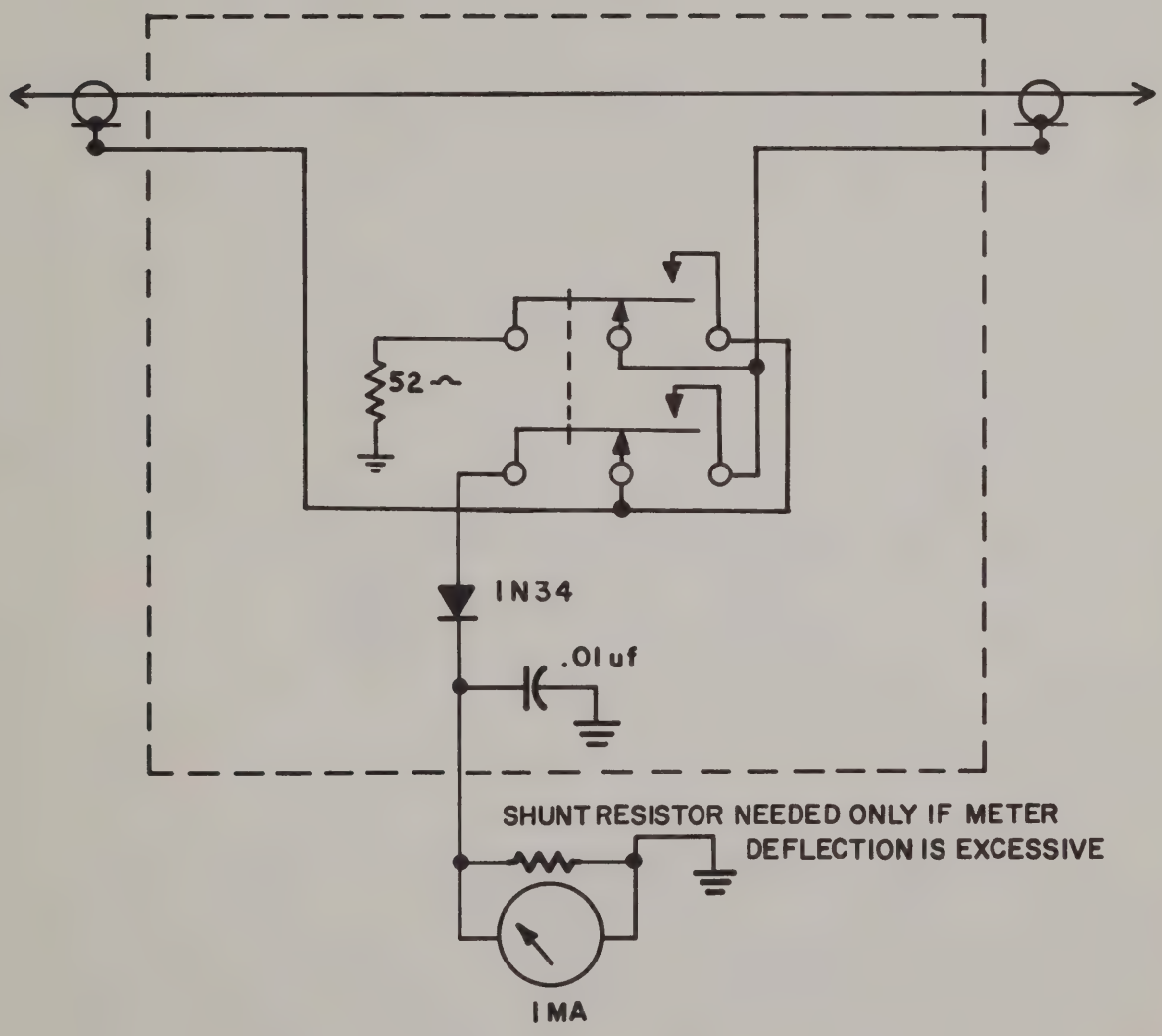
TITLE		DRAWN	NO.
SCHEMATIC T-10-R/T-10-D 28 V		C.W.H.	100L1
SUNAIR ELECTRONICS INC		CHECKED	DATE 8-4-61

MODIFICATIONS

Effective with Serial Number T-10-D, 14 V A1019
T-10-D, 28 V A1051 and following
T-10-R, 14 V B1091
T-10-R, 28 V B1046

PAGE	SYMBOL	WAS	CHANGED TO
Schematic	R 54	---	Connect 10 k/.5 w resistor from pin 6 to ground - V 1

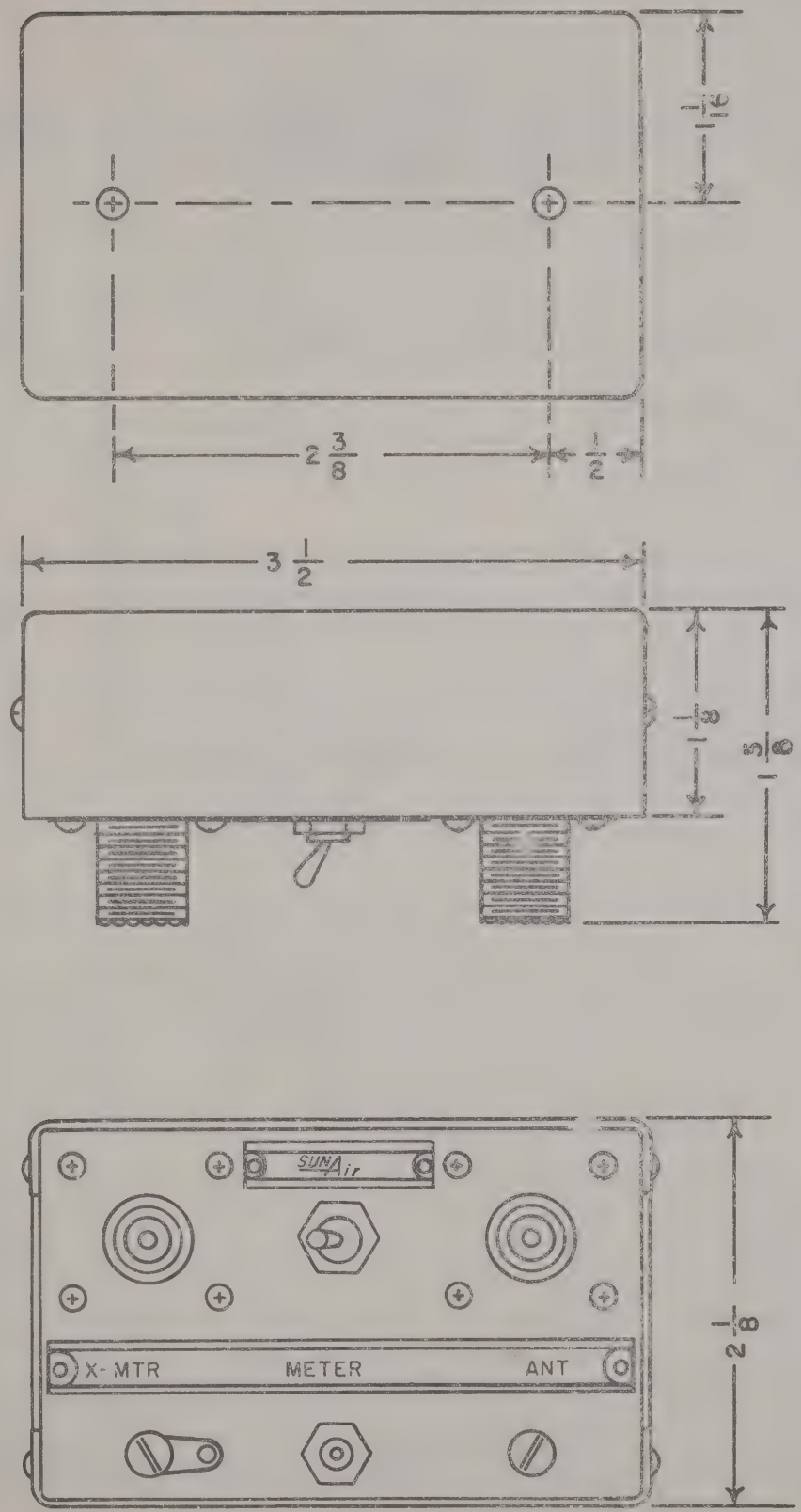



52 ~
IN34
.01 uf
SHUNT RESISTOR NEEDED ONLY IF METER
DEFLECTION IS EXCESSIVE
1 MA

NOTE : DRILL TWO (2) 5/32 HOLES FOR MOUNTING

[redacted]

SWRD-1
STANDING WAVE
RATIO DETECTOR
SunAir P/N 91396

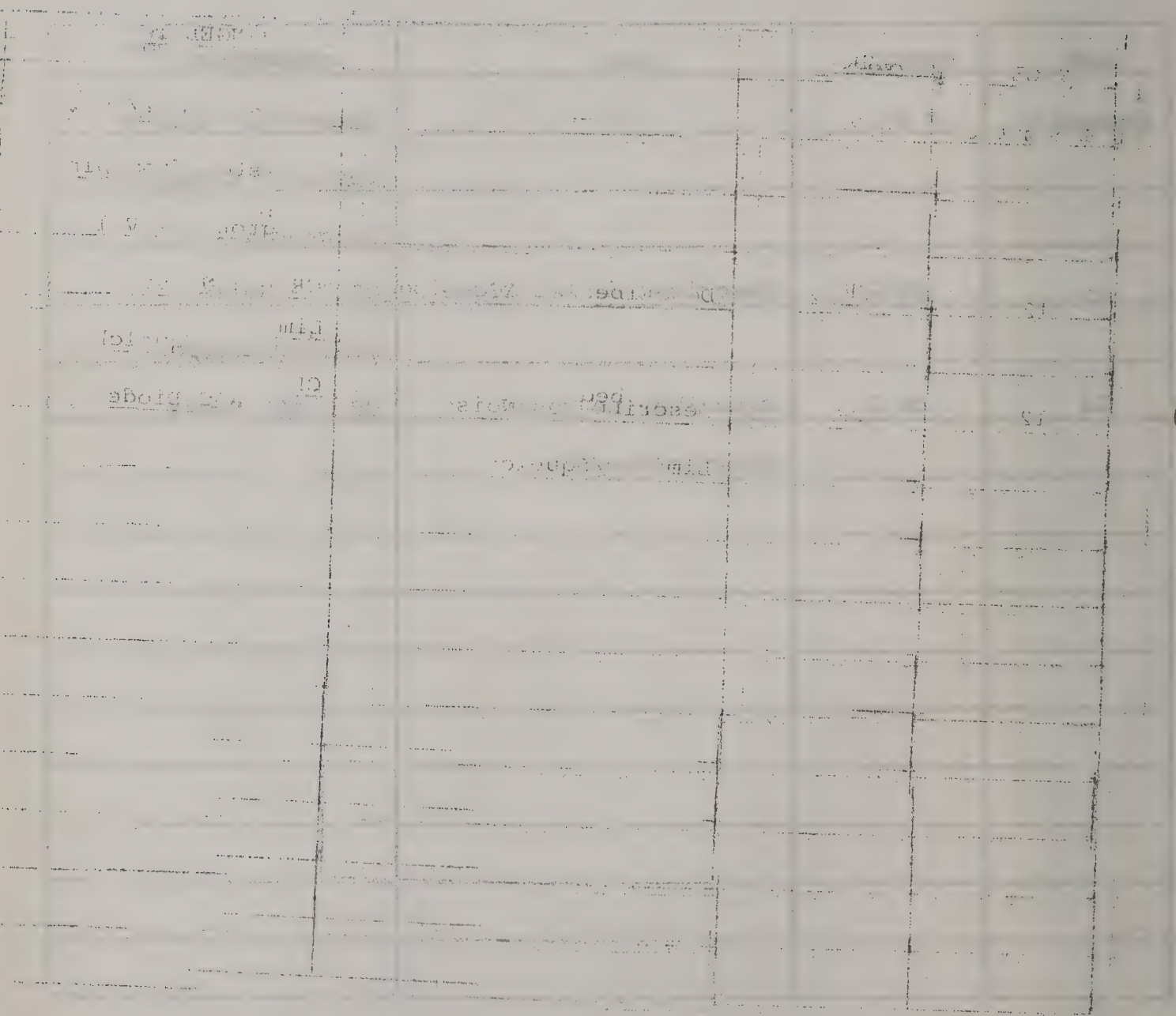


WEIGHT : 7.0Z.

MODIFICATIONS

Effective with Serial Number T-10-D, 14 V A1019
T-10-D, 28 V A1051 and following
T-10-R, 14 V B1091
T-10-R, 28 V B1046

PAGE	SYMBOL	WAS	CHANGED TO
Schematic	R 54	---	Connect 10 k/.5 w resistor from pin 6 to ground - V 1
12	CR 2	Described as AGC Diode	CR 3 - Noise Limiter/Squelch
12	CR 3	Described as Noise Limiter/Squelch	CR 2 AGC Diode



SunAir Electronics, Inc.

ANTENNA COUPLING UNIT

INSTALLATION AND TUNING INSTRUCTIONS

Your LU Load Unit, serial number_____has been pretuned on all channels to operate into a_____foot antenna. Only final tuning adjustments should be necessary.

A Bird Electronic Corporation Thru Line Wattmeter, Model No. 43 (Cleveland, Ohio, U.S.A.) or equivalent with line impedance of 50 ohms and having a 2 through 30 MC 100 watt plug-in element is needed to properly adjust this unit.

Steps for installation of this unit are as follows:

1. The LU Load Unit should be mounted as near as possible to the location where the lead-in is to be brought through the skin of the aircraft.

2. The lead-in should be unshielded #14 wire and for optimum performance should approximate 6 inches in length, not to exceed 12 inches.

3. A good ground should be provided between the aircraft and the LU Load Unit.

4. The antenna installed on the aircraft should be the exact length as given on the order for the load unit. This length should include the lead-in. In some cases variation from the specified length can cause a condition wherein the resonance desired will be beyond the variable range of the unit and may make optimum tuning difficult or impossible. In some cases, the installation of a tight "V" antenna will electrically shorten the antenna.

5. The wattmeter or equivalent should be placed in series with the transmitter output (between the transmitter and load box.)

6. Procedure for obtaining minimum standing wave and maximum power output:

(A) Tuning should start on channel 1. The number of the channel is indicated next to the coil for that channel.

(B) Depress microphone button and rotate slug in the No. 1 coil to obtain a minimum reading with as near zero indication as possible.

(C) Switch the equipment for forward reading. Depress mike button and observe forward output.

(D) Switch testing unit back and forth, meanwhile rotating slug to obtain a minimum standing wave with maximum power output. (If these steps fail to achieve a minimum reading with maximum power, leave slug in position where best results are obtained and prepare to change tap on air-duct coil.)

(E) Refer to the block diagram provided with the unit and identify the tap on the air-duct coil for channel. If slug in coil is all the way in coil, the tap should be moved one turn at a time away from the wafer switch. If the slug is all the way out, move tap one turn at a time toward the wafer switch, each time checking for (A), (B) and (C).

(F) The block diagram may show two coils for one channel. In this event, either coil will affect tuning. Optimum results can be obtained by using the same amount of slug in each coil.

(G) Repeat procedures as outlined on remainder of channels.

(H) Final Fine Tuning: Since tuning each channel has a slight detuning affect on the other channels, a final check should be given each channel for any fine adjustment necessary.

(I) An in-flight tuning check may be desirable to correct for any ground effect that may be present if antenna is close to ground, such as in a helicopter installation.

```
**************************
*                        *
*                        *
*    C A U T I O N       *
*                        *
*                        *
**************************
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Tighten the lock net on the tuning slug securely to prevent detuning from vibration during flight operation. Ascertain that slug does not turn while lock nut is being tightened.

DO NOT OPERATE TRANSMITTER FOR EXTENDED PERIODS IN A DETUNED CONDITION. SERIOUS DAMAGE MAY RESULT TO TUBES, TRANSISTORS AND ASSOCIATED PARTS.

FIELD EMERGENCY TUNING PROCEDURES

USING A STANDARD VOLTMETER

AND SWRD-1 (STANDING WAVE RATIO DETECTOR)

The SWRD-1 is designed to facilitate tuning when a Bird Wattmeter or equivalent is not available. The SWRD-1 is a permanent installation when only fixed antenna system is installed.

NOTE: When trail system is to be used, note paragraph 8.

1. The SWRD-1 should be mounted near the load unit and good ground contact provided.

2. RG-58-AU coaxial cable from the transmitter is connected to the plug provided and inserted into the receptacle marked, "X-MTR."

3. RG-58-AU coaxial cable from the load unit is connected to the plug provided and inserted into the receptacle marked, "ANT."

4. The negative lead of a voltmeter having 0-20 ma range is connected to the ground lug located directly under the "X-MTR."

5. Positive lead of the voltmeter is attached to the feedthrough connection marked, "METER."

6. Place switch on SWRD-1 to "X-MTR." Proceed as described in step No. 6 of the LU Installation Instructions to obtain a minimum standing wave with maximum power output.

7. After tuning is completed on all channels, leave switch in "ANT" position.

8. In case a trailing antenna system is also to be installed, the SWRD-1 may be used for indication of resonance in trail operation as follows:

(A) Place switch on SWRD-1 in "X-MTR" position

(B) Reel out trail antenna until first dip is shown on the R.F. indicator

(C) Reel back through first deflection for minimum indication

(D) Channel is now in resonance
Note setting on reel control box for future use

(E) With switch on SWRD-1 in "X-MTR" position, a minimum indication will be noted on the R.F. indicator when transmitter is used on fixed antenna system.

(F) Advise pilot as to the meter readings to be expected as they differ from standard

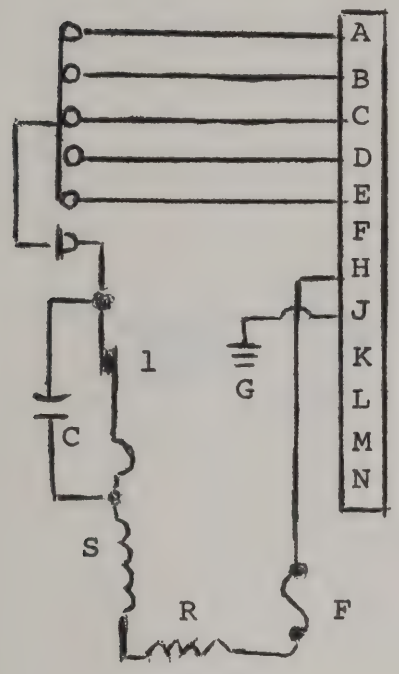
The fixed antenna installation for use with the LU Load Unit is very critical in that the length given on the order must be that which is installed. The Load Unit is pretuned in the factory to match an end-fed antenna of the length and configuration as given on the order. If this exact length is not installed on the aircraft, difficulty may be experienced in tuning on some channels. The resonant frequency of an antenna changes depending on whether it is an open V, tight V or straight wire. For example, a 29 foot straight antenna has a resonance of approximately 8.5 mc. The resonant frequency of a 29 foot V antenna is approximately 8.2 mc.

Various configurations may be used as shown on page Best results on single engine and small twin aircraft have been obtained by using 29, 31 or 34 foot lengths and mounting the antenna from fuselage to tail to wing tip. No directional characteristics have been noted with this configuration.

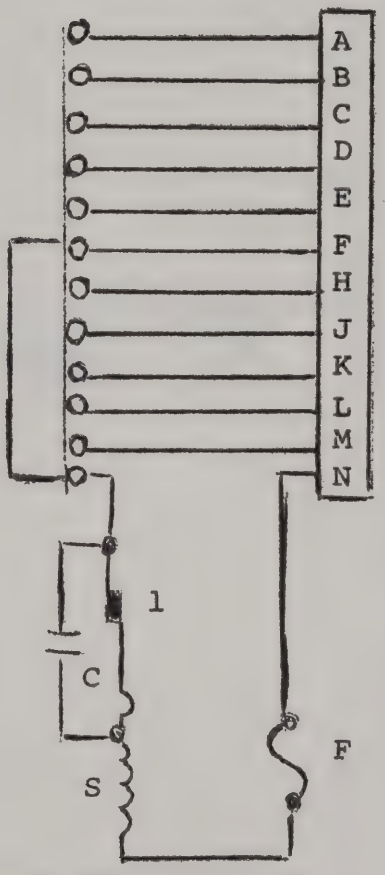
The total antenna length must include the lead-in to the load unit. The lead-in length should be as short as possible and not over 12 inches.

LOAD UNIT CHANNELING CIRCUITRY

All LU-5s, LU-10s and LU-22-RA-28

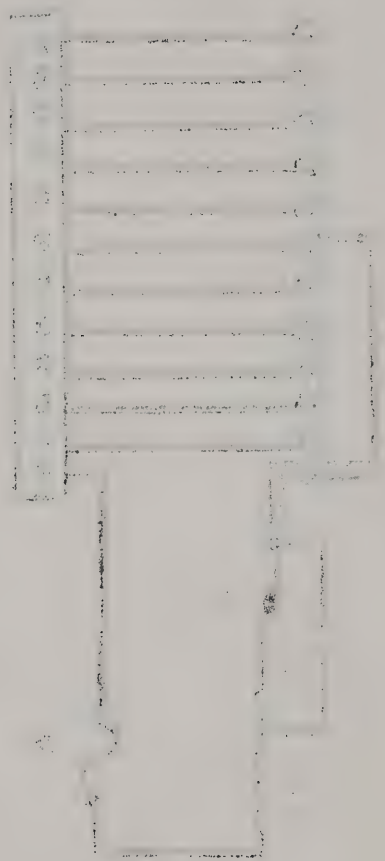


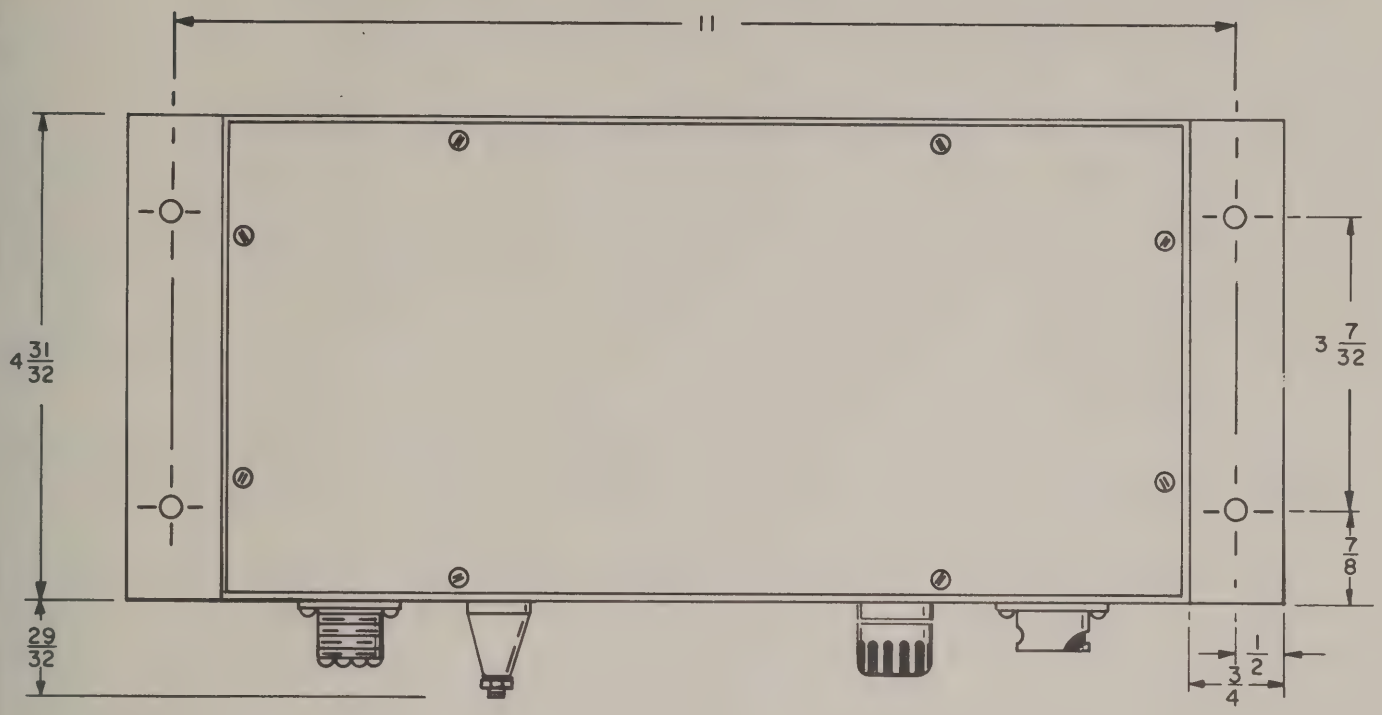
LU-22-14M and LU-22-28M

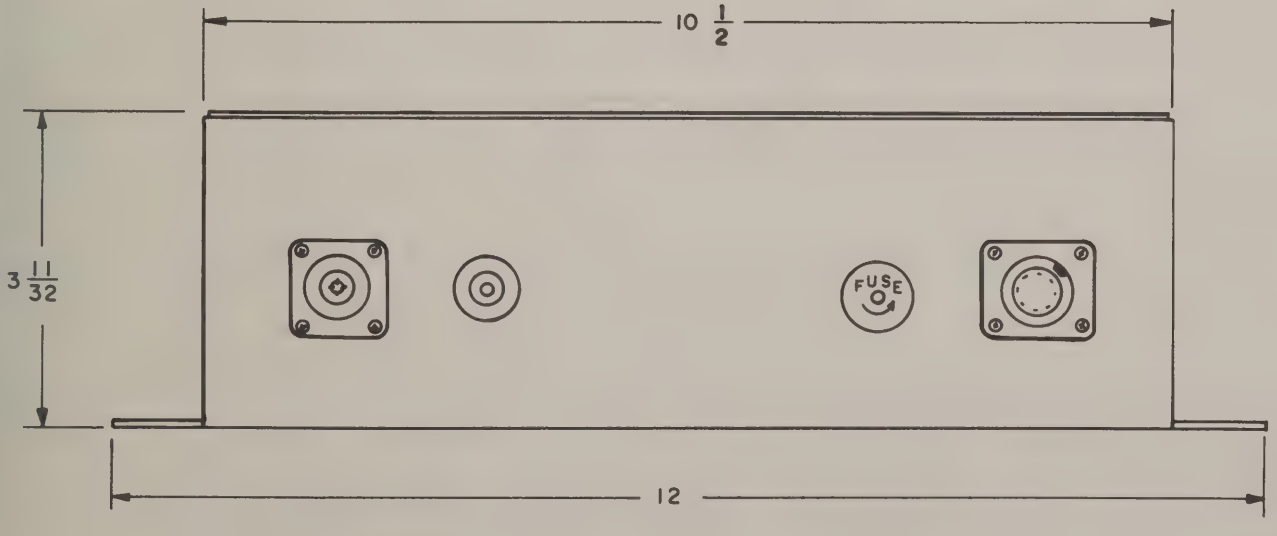


1 - Interrupter
C - 47 mf
S - Rotary Solenoid
G - Ground to Chassis
F - Fuse
R - S 10w (All 28 V except M Series)
- 2.5 20w (All 14 V except M Series)
- None (All M Series)

TRANSCEIVER	LOAD UNIT
T-5-DA	LU5 - 14M/28M
T-5-RA	LU5 - 14/28
T-10-D	LU10 - 14/28
T-10-R	LU10 - 14/28
T-22-RA	LU22 - RA-28
T-5-D	LU5 - 14M/28M
T-5-R	LU5 - 14M/28M
S-5-DTR	LU5 - 14M/28M
S-5-RTR	LU5 - 14M/28M
T-22-R	LU22 - 14M/28M
S-22-RTR	LU22 - 14M/28M







Over-all dimensions of LU Series Load Unit

SUNAir SERVICE LETTER

SERVICE LETTER NO. 4

ALL SUNAIR TRANSCEIVERS

ANTENNA INSTALLATIONS:

PROPER INSTALLATION OF TRAILING WIRE SOCK:

Any airplane having a cruise of 200 mph or more should have half the surface area on the drag sock removed. Accomplish this by shearing off the back half. When installing the drag sock on the trailing wire antenna, insure that the drag sock itself can rotate freely on its own connection, so the antenna will not twist and snag when reeled in. Teflon funnels will be used from this date on in place of drag cups. Experience proves the funnels to be far superior and longer lasting. The angle of the fair-lead with respect to the antenna is very important. If the fair-lead is in direct line with the antenna, proper electrical connection cannot be accomplished. If the angle is too large, extreme wear will occur on the fair-lead and excessive drag will be imposed upon the antenna itself. In some installations on certain aircraft the drag sock has been placed in a position such that a vacuum exists in that particular area and the sock will not pull out. This can be alleviated by attaching a small lead weight to the frame of the sock. If the fair-lead is mounted forward in the aircraft, a weight may be attached so the sock will not tend to rotate or strike the fuselage.

CRITICAL INSTALLATION LENGTHS AND DISTANCES:

The length of wire between the loading unit and the fixed antenna feed-through must be as short as possible. It should not exceed six inches but in some cases may be as great as twelve inches if absolutely necessary. Too great a distance will cause excessive radiation inside the aircraft, resulting in considerable de-tuning, even though proper tuning is indicated on the meter. Caution must

also be observed in the trailing wire installation. It should be possible to reel nearly all the antenna onto the reel. Since frequencies of 10 to 15 megacycles have effective quarter wave lengths of between 12 to 7 feet, it is evident that excessive fair-lead and stand-off insulator lengths will produce undesirable transmission effects.

If the unit is installed on the rear of the aircraft and a coaxial cable is run all the way from the set to the front (as on temporary ferry installations) severe de-tuning and inefficient antenna loading can result. The length of cable from the transmitter to the manual reel should be as short as possible. In all fixed antenna installations, a minimum of six inches should exist between the antenna and the fuselage. The more separation that can be obtained, the more efficient the operation will be.

14 VOLT REEL MOTORS:

The 14 volt electric reel motor normally does not have as much efficiency or torque as the 24 volt motor. In some cases when employing 14 volt systems in aircraft that have speed ranges from 180 to 220 mph, it will be necessary to slow the airplane down when reeling the antenna in. This condition can be relieved by the method mentioned previously - cutting down the surface area of the drag cup. In cases of 14 volt electric reel motors, the condition arises where the light sometimes does not go out because the reel has not pulled the drag cup completely in (within one inch). This should be relieved by re-adjustment of the micro switch in the electric reel.

SOLDER JOINTS:

All solder joints involved in the antenna installation must be extremely solid as vibration, corrosion and arc-ing can cause considerable trouble.

RF INVERTER LOCATION:

The RF inverter must in all cases be located at the junction of the coax feedline and the antenna reel, whether the installation is manual or remote. If the RF inverter is located any place along the coax line, or directly on the output of the transmitter, false tuning indications will appear and it will be impossible to tune the trailing wire properly.

SUNAir SERVICE LETTER S/A 109

SERVICE LETTER NO. 5

Elimination of Excessive Noise

In some instances after a transceiver is installed and thoroughly checked on the ground, extremely noisy operation is encountered when airborne. This receiver noise can reach such an intensity that the audio is indistinct and unreadable. This noise, that exists only when the equipment is airborne, is traced to two causes:

1) It is very important that all contacts on the coax relay be securely tightened and the relay itself mounted in such a way that aircraft vibration will not tend to loosen the contact.

2) All aircraft should have static wicks installed on the trailing surfaces of the wings, rudder and stabilizer. This noise, derived from the static electricity, is very eratic and must be eliminated before reliable, noise-free reception can be accomplished.

SunAir SERVICE LETTER

SERVICE LETTER NO. 6

Frequency Selection of Channels

The 22 channel SunAir Transceiver utilizes one coil for tuning one pair of frequencies, i.e. channel 1 and channel 2 are adjacent with one coil, channel 3 and channel 4, etc.

In order to obtain maximum performance from the equipment, frequency of the produced channels should not have a difference in excess of the maximums listed below:

T-22-R

Frequency Range	Maximum Separation
2 to 5 mc.	250 kc.
5 to 8 mc.	500 kc.
8 to 13.5 mc.	800 kc.

T-22-RA

Frequency Range	Maximum Separation
2 to 5 mc.	500 kc.
5 to 10 mc.	1000 kc.
10 to 15 mc.	1500 kc.

SunAir SERVICE LETTER

GUIDE FOR

FREQUENCY SELECTION OF CHANNELS ON

SUNAIR T-10-D, T-10-R, T-22-R and T-22-RA TRANSCEIVERS

Four models of SunAir Transceivers utilize one coil for tuning one pair of frequencies in adjacent channels.

For example, in the T-10, T-22-R and T-22-RA models, channels 1 and 2 are tuned with one coil, channels 3 and 4, etc.

In order to obtain satisfactory performance from these units, frequency of the adjacent channels should not have a difference in excess of the maximums as listed below:

T-10-D, T-10-R, T-22-R

Frequency Range	Maximum Separation
2 to 5 mc.	250 kc.
5 to 8 mc.	500 kc.
8 to 18 mc.	800 kc.

T-22-RA

Frequency Range	Maximum Separation
2 to 5 mc.	500 kc.
5 to 10 mc.	1000 kc.
10 to 18 mc.	1500 kc.

In addition, a minimum of 5 kc separation must be maintained between adjacent channels--1-2, 3-4, 5-6, etc. on the T-10-D, T-10-R, T-22-R and T-22-RA.

Amended 3-2-62

SUNAir SERVICE LETTER S/A 111

March 14, 1961

SERVICE LETTER #8

SERVICE AND INSTALLATION HINTS ON FIXED ANTENNAS

The lead length between the load coil and fixed antenna insulator should not exceed 12" under any circumstances. A 6" length or less is preferrable. Too great a length will cause excessive radiation inside the aircraft, resulting in considerable de-tuning and very limited ranges of communications.

The length of the lead from the load coil to antenna insulator should be considered when calculating the length of the fixed antenna, as this lead becomes part of the radiating element when in use.

Several instances have been encountered where the transmitter itself had been detuned in an effort to match the transmitter to the antenna. The transmitter should not be retuned, under any circumstances, unless a 52 ohm load is connected to the transmitter output.

Tuning the transmitter to the antenna, results in severe detuning of the transmitter itself, causing it to draw excessive current, which will cause extensive over-heating of the unit and resultant damage. Off-resonance or detuning of the transmitter will encourage failure. The antenna and load coil should be matched to the transmitter, and no attempt should be made to tune the transmitter to the antenna.

SunAir SERVICE LETTER

SERVICE LETTER NO. 10

SUBJECT: Use of SWRD-1 with trail antenna system

The SWRD-1 was designed to facilitate tuning the LU Series Load Unit when a Bird Wattmeter or equivalent is not available. It was designed to be used with a fixed antenna system only. The SWRD-1 performs the same function as the SunAir R.F. Inverter. On installations using both trail and fixed antennas, the following should be noted:

1. After tuning, the switch on the SWRD-1 should be left in the "X-MTR" position.

2. When the trail antenna is reeled out, an indication of resonance will be indicated by a dip instead of a peak on the R.F. Meter.

3. The trail antenna should be reeled out until first dip is shown. Then reel back through the first deflection for minimum indication. This minimum indication will show channel is in resonance in the same manner as a peak shows resonance when using an R.F. Inverter.

4. Minimum indication will also be noted during modulation on the transmitter using a fixed antenna.

The operator of the aircraft should be advised of the minimum readings to be expected since maximum readings are normally obtained during transmissions using the R.F. Inverter in standard installations.

February 7, 1962

SUNAir SERVICE LETTER

S/A 113

SERVICE LETTER NO. 11

Audio amplifier T-22-RA

In order to upgrade the audio amplifier performance, the following changes are recommended:

1. Refer to page 21 of the T-22-RA Technical Manual. Change resistor R38 from 3.9 k to 33 k, 1/2 watt; Change transistors Q1 and Q2 from type 2N1379 to type 2N2043.

2. Refer to page 17 of the T-22-RA Technical Manual. Change resistor R41 from 350 ohms to 150 ohms, 3 watts.

C-114 - T-22-RA

Several reports have been received regarding breakage of the solder connection between C-114 and ground. It is suggested that several loops be made in the lead between the capacitor and ground. This should relieve any strain at the ground connection.

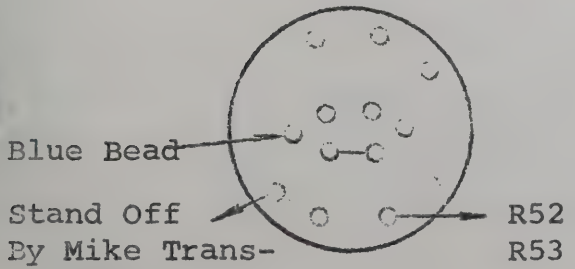
Reduction in arcing of K2 relay high voltage contacts in T-22-RA

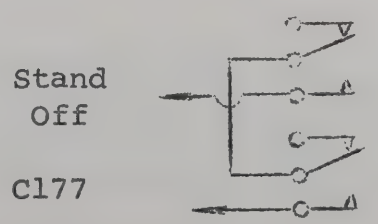
Some reports have been received indicating variance from standard in the sealed relay used as K2 in the T-22-RA. In order to avoid possibility of internal arcing causing relay to fail, the following is suggested:

1. Change C-183 from a .01 mfd capacitor to a .05 mfd 1.5 KV capacitor.

2. Change wiring of relay K2 to conform with following diagram. Contacts shown not wired are connected as at present.

Top of Relay





3-30-62

SunAir SERVICE LETTER

SERVICE LETTER NO. 12

1. EXTENSION OF VOLUME CONTROL RANGE T-22-R and T-22-RA

Correct Service Letter No. 11 to read, "Connect a 10 K ohm .5 w resistor from pin 6 to V 1 to ground." Do not change resistor R 4 from its present value and location.

2. EXTENSION OF VOLUME CONTROL RANGE T 5 and T 10 UNITS

In order to extend the volume control range of T 5 and T 10 units, connect a 10 K ohm .5 w resistor from pin 6 of V 1 to ground.

3. RADIO FREQUENCY POWER OUTPUT VS. BATTERY VOLTAGE

The only source of power for airborne communications equipment is the aircraft battery and the generator or generators which are driven by the aircraft engines. Since the voltage regulators, as they are being used at present for generators, are adjusted to the nominal aircraft board voltage of either 13.75 or 27.50 V, it is definitely required to supply this voltage to the input terminals of the communications equipment. Equipment such as SunAir Transceivers have been designed to operate satisfactorily at those voltages as mentioned above. Only at these voltages will they deliver the rated R.F. power output as well as the rated audio frequency power output into the speaker and headphones, respectively.

In the past it has been shown that sometimes the installation practices caused a voltage loss across the connection cable from the battery terminals to the transceiver terminals. This, then, would mean that the transceiver did not obtain the full nominal voltage for which it was originally designed. Consequently, the performance of the transceiver will suffer.

4. RECEIVER SENSITIVITY - T-22-RA

Receiver sensitivity above 8 mc in the T-22-RA can usually be increased by installing crystals cut 1500 kc below the operating frequency.

The T-22-RA will now be supplied with receive crystals for 8 mc frequencies and above cut 1500 kc below the operating frequency, instead of 1500 kc above.

5. ELECTROLYTIC CAPACITORS

Some electrolytic capacitors used in SunAir equipment have a tendency to "age" when the equipment is not used regularly. Due to this aging action, chances of breakdown in the capacitor are increased. If the aircraft is not scheduled to be used for regular periods, it is suggested that

the transceiver be turned on every two weeks and the receiver be allowed to operate for a period of 15 to 20 minutes.

6. FIXED ANTENNA INSTALLATIONS

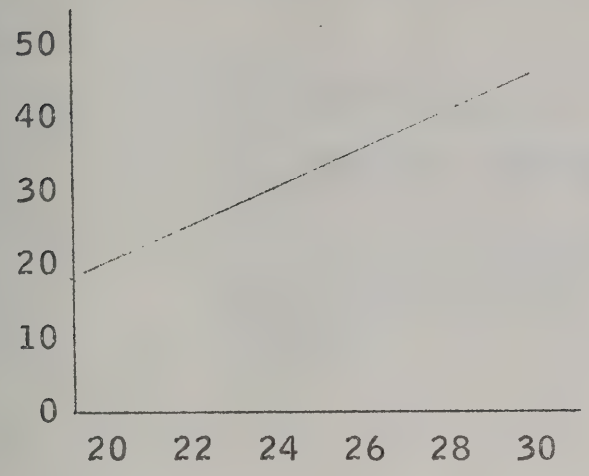
Recent reports from the field indicate a problem on a V type antenna installation in flight only. With the transceiver and the LU antenna coupling device tuned properly on the ground, it was found that in flight an off resonant condition was effected due to termination of the antenna into a spring device to hold the antenna taut. It was found that the antenna would "belly back" causing a physical lengthening of the antenna which would then result in detuning or off resonant condition in flight only. Therefore, it is of the utmost importance that all portions of the fixed antenna be taut, and it is suggested that a spring loaded device be used with caution, if at all.

It should also be noted in conjunction with LU load unit installations that the exact length as specified on the order be installed. This means exact to the inch. The lead-in inside the aircraft should be 6 inches or under in length.

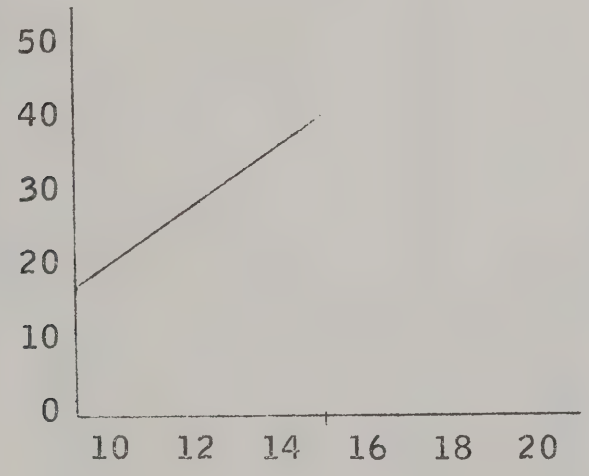
Strict adherence to instructions provided with the load unit will minimize the tuning adjustments necessary and insure proper performance and customer satisfaction.

S/A 127

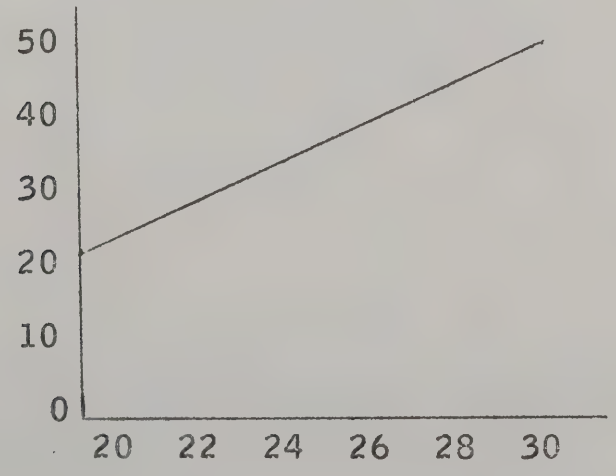
PRIMARY VOLTAGE/R.F. OUTPUT CURVE
T-10-R 28V



PRIMARY VOLTAGE/R.F. OUTPUT CURVE
T-5-DA 14V



PRIMARY VOLTAGE/R.F. OUTPUT CURVE
T-22-R 28V



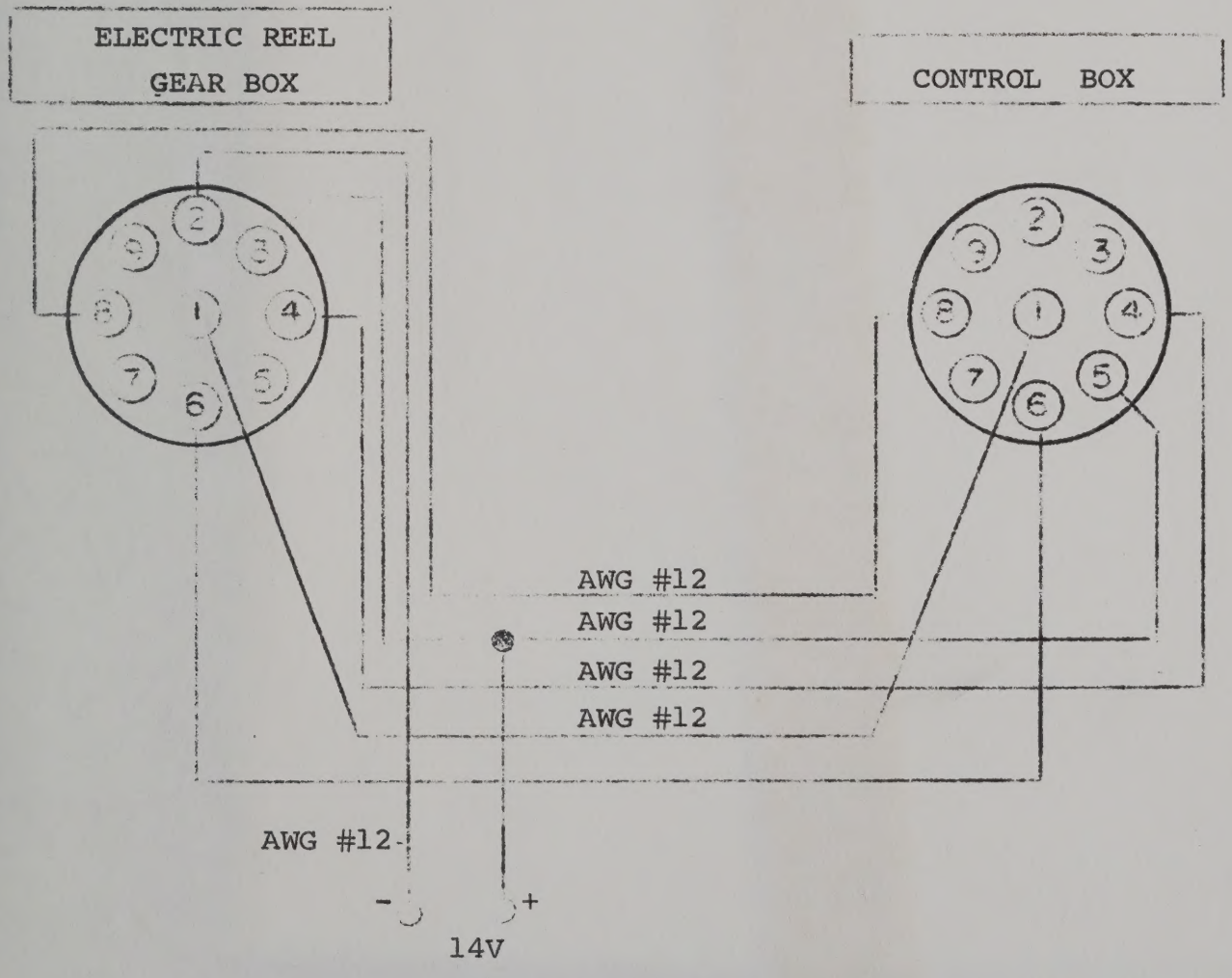
SunAir SERVICE LETTER

S/A 162

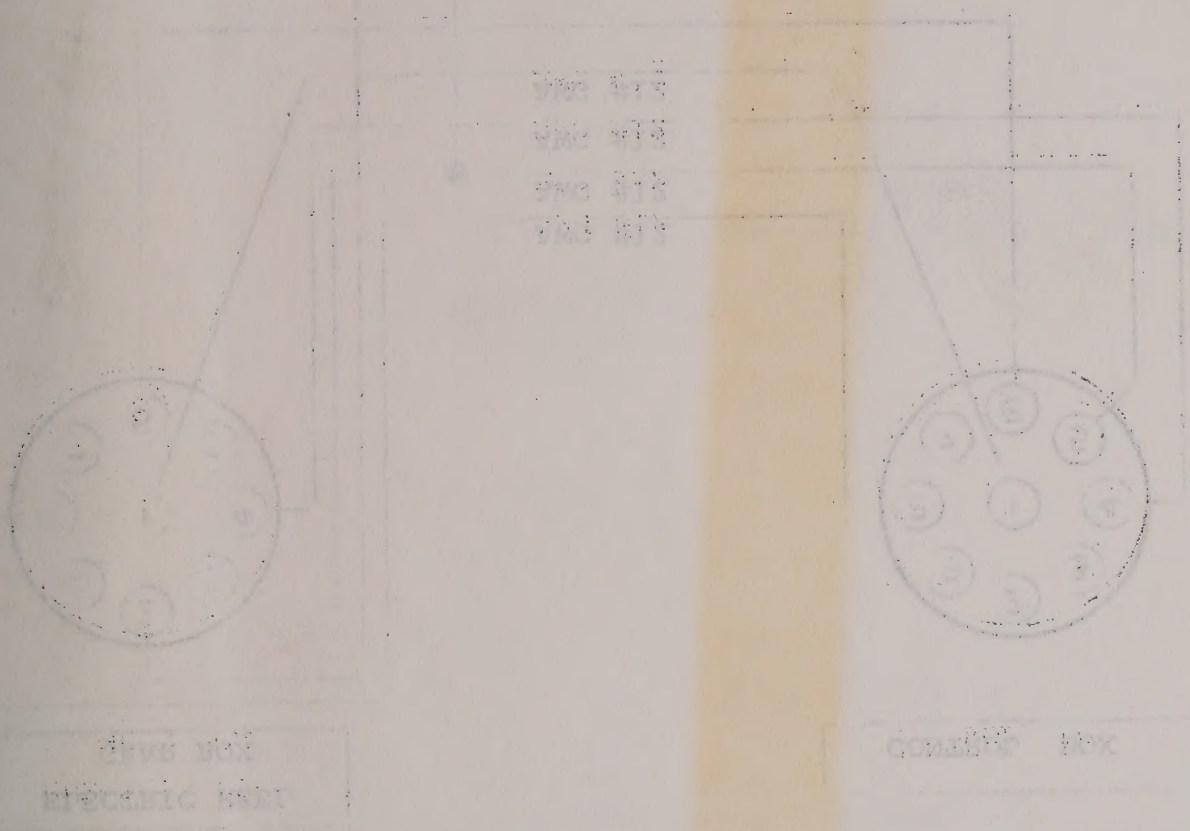
SERVICE LETTER NO. 13 7/26/62

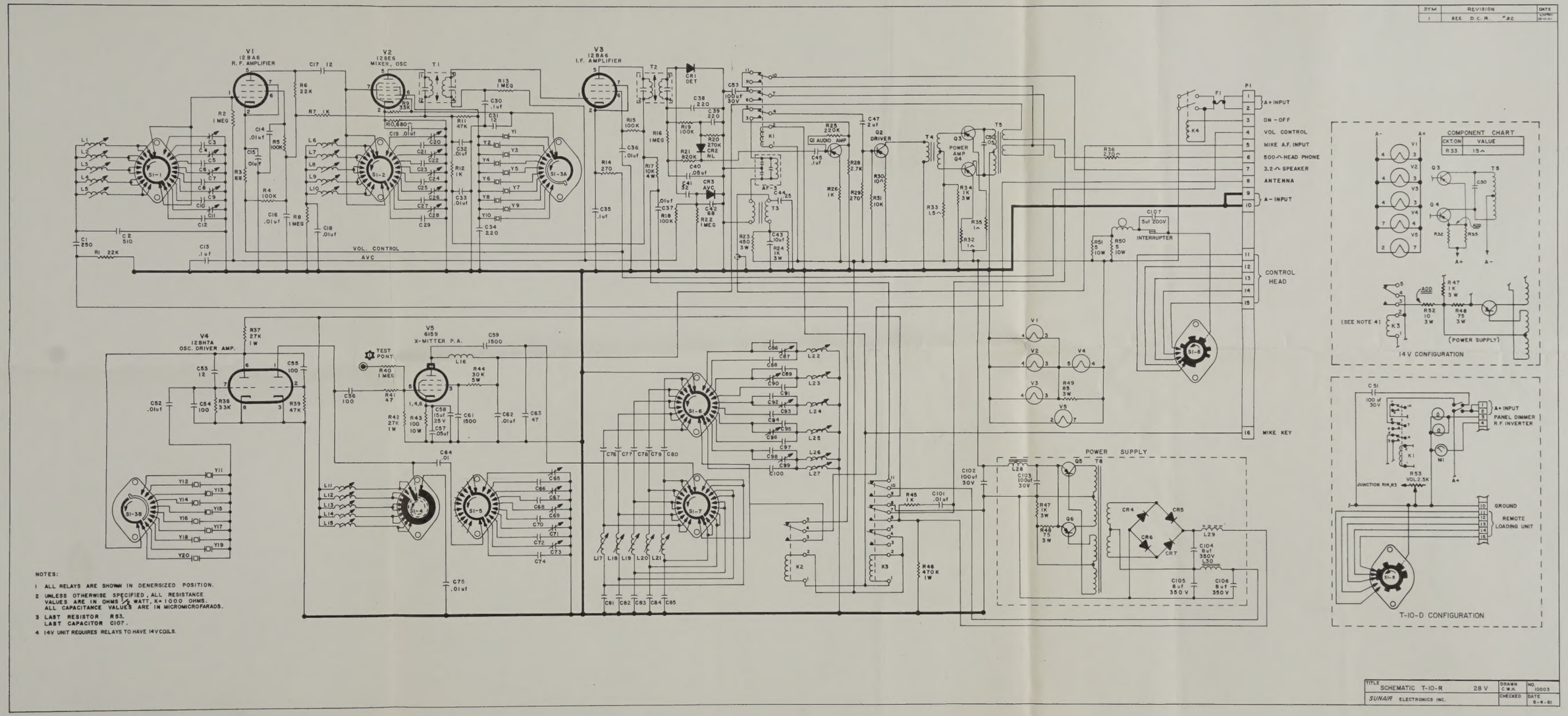
1. 14V ELECTRIC MOTOR FOR TRAILING ANTENNA SYSTEM

To insure satisfactory operation, all 14 volt electric reel motors received from SunAir after July 26, 1962 should be installed in accordance with the following diagram.



AWG #12: 19 X .019 INCH DIAMETER INSULATED W/BRAIDED VARNISH IMPREGNATED COTTON JACKET PACKARD #54913 R16 OR EQUIVALENT.





NOTES:

1 ALL RELAYS ARE SHOWN IN DENERGIZED POSITION.

2 UNLESS OTHERWISE SPECIFIED, ALL RESISTANCE VALUES ARE IN OHMS 1/2 WATT, K= 1000 OHMS. ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS.

3 LAST RESISTOR R53.
LAST CAPACITOR C107.

4 14V UNIT REQUIRES RELAYS TO HAVE 14V COILS.

SYM	REVISION	DATE
1	SEE D.C.R #32	[illegible]

TITLE	DRAWN	NO.
SCHEMATIC T-10-R 28 V	C.W.H.	10003
SUNAIR ELECTRONICS INC.	CHECKED	DATE 8-4-61